NETWORK WORLD

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DEC bows to IBM in battle of net mgmt. wares

BY JIM DUFFY

Digital Equipment Corp. last week closed the book on its five-year effort to develop a competitive network and systems management platform by announcing an agreement with IBM to resell NetView/6000.

Under the deal, which was signed two weeks ago after only three months of discussion, DEC and IBM will work together to port NV/6000 to DEC's Alpha processors and OSF/1 operating system. That product will be marketed by DEC as Polycenter NetView and will be available in the first quarter of 1994.

IBM and DEC said they will also port the product to DEC's OpenVMS and Microsoft Corp.'s Windows NT operating systems and to Sun Microsystems, Inc. SPARCstations. Release dates for those products have not yet been established.

The archrivals also pledged to develop future versions of Polycenter NetView and NV/6000 from a single code base and release products simultaneously on their respective systems. "We have declared an end to this platform war between us," said Bill Warner, IBM

See **Battle**, *page 74*

DEC's troubled net management path

1988
Enterprise Management Architecture announced.

1989
Development partners report DEC off delivery schedule by 6 - 12 months.

1991
Open Software Foundation, Inc. gives DEC black eye by passing up core DECmcc Director technology in favor of Hewlett-Packard Co.'s OpenView for use in the Distributed Management Environment.

1992
DEC delivers Unix version of DECmcc Director — now called Polycenter Framework — but too late. Long ties to proprietary VMS all but killed any chance of attracting support of application developers.

Sprint rolls out ATM

Hughes Aircraft will deploy the service for LAN interconnection.

BY ELLEN MESSMER

San Francisco

Daring to be first, Sprint Corp. last week introduced a nationwide T-3-speed Asynchronous Transfer Mode (ATM) service and said it has signed a contract with its first customer, Hughes Aircraft Co.

With the announcement, Sprint takes its place in history as the first long-distance carrier to make ATM service commercially available. Hughes Aircraft will use the service to link local-area networks at sites across the country in a pilot project designed to evaluate ATM's cost-effectiveness and performance.

The Hughes Aircraft ATM pilot, which will also involve Pacific Bell (see story, page 4), will last through March 1994 and initially involve 1,000 corporate LAN users, according to Robert Emmett, manager of network architecture at Hughes Aircraft.

If the pilot is successful, Hughes Aircraft will expand its use of ATM. With the aircraft company's 45,000 LAN nodes and its requirements for distributing computing, videoconferencing and visualization,

See **Sprint**, *page 74*

SCOTT MCKIERNAN

Hughes Aircraft's Robert Emmett (center) flanked by Sprint's Dominique DeAngelo (left) and Greg Crosby.

Fibronics makes 12G-bit splash

BY SKIP MACASKILL

San Francisco

Fibronics International, Inc. last week raised the stakes in the switching hub market with the introduction of a device that has a capacity of more than 12G bit/sec.

The company's GigaHub, which was introduced at the INTEROP 93 August trade show here, offers almost four times the backplane capacity of similar products, such as Hughes LAN Systems, Inc.'s Enterprise Hub.

GigaHub is the centerpiece of Fibronics' effort to provide a local-area network platform that supports virtual networking and emerging technologies such as Asynchronous Transfer Mode (ATM).

The 12-slot device is based on a new MatrixBus architecture, which consists of 40 independent physical buses that each have a capacity of 300M bit/sec, giving the hub an aggregate capacity of 12G bit/sec. The buses can be used to support 40 token-ring LANs, 40 Fiber Distributed Data Interface LANs or any combination of the two. In addition, the GigaHub has eight Ethernet buses.

The box will be backward-compatible with the company's existing MultiHub intelligent line, enabling customers to employ MultiHub token-ring, Ethernet

See **Fibronics**, *page 73*

IBI raises the ante for distributed data access

BY WAYNE ECKERSON

New York

Information Builders, Inc. (IBI) is readying a new generation of data access products that will provide location-transparent access from the desktop to SQL and non-SQL databases throughout an enterprise net.

SENOR

Sources close to the company said IBI will announce Enterprise Data Access (EDA)/SQL Version 3.0 in December and ship the product shortly thereafter. EDA/SQL is client/server software that provides read and write access to more than 50 SQL and non-SQL databases.

EDA/SQL 3.0 is expected to incorporate distributed services based on the Open Software Foundation, Inc.'s (OSF) Distributed Computing Environment (DCE), sources said. These include distributed directory and security services as well as centralized administration of distributed resources.

In addition, EDA/SQL 3.0 will support copy management, data propagation and replication services, allowing users to utilize EDA/SQL for data warehousing purposes.

Further, EDA/SQL will support the SQL Access Group's Call Level Interface, which is an industry standard interface for accessing multivendor databases. EDA/SQL currently uses a proprietary application program interface (API) called API/SQL.

See **IBI**, *page 73*

NEWSPAPER

Client/server computing forges new IS partnership

BY BOB BROWN
AND WAYNE ECKERSON

The move to client/server is making for strange bedfellows in many information systems shops. Once virtual strangers, application developers and network experts increasingly are being thrust together on joint project teams.

Corporate application and network pros need to collaborate to ensure that client/server applications are designed to use the network efficiently and that networks contain enough bandwidth to support the applications and provide good response times. The groups also need to share management and support responsibilities once projects are completed.

"Users are finding that they cannot expect a sophisticated client/server application to work if they just throw it onto any old network and walk away," said Jeff Held, a partner in the Technology Services Practice of Ernst & Young in Vienna, Va.

Jim Bullock, MIS development manager of three Cellular One cellular phone companies in upstate New York, said cooperation between network and application people has been important to the success of a big client/server project being implemented there.

"The whole idea that the network staff is going to

See **Partnership**, *page 73*

Ranking impact of client/server applications on net bandwidth

SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

Briefs

Hello. Is ISDN there? Combinet, Inc. announced a bulletin board service (BBS) at INTEROP 93 last week that will enable users to dial in to check on the deployment status of Integrated Services Digital Network offerings. The data, supplied by Bell Communications Research and updated quarterly, can be accessed for free using a 2,400 bit/sec modem at (408) 733-4312. The BBS will prompt callers to enter area codes and three-digit exchanges to determine ISDN availability. The service will also list information regarding carrier installation prices and monthly charges.

Novell shuffles, shows slower growth. Novell, Inc. last week created an office of the president and announced that Chairman and Chief Executive Officer Ray Noorda will no longer run day-to-day operations, focusing instead on company relationships and directions. Operations will now be handled by Mary Burnside, chief operating officer and executive vice president of the corporate services group, and James Tolonen, Novell's chief financial officer. Burnside will be responsible for Novell's three primary product groups: the NetWare Systems Group, the Unix Systems Group and the newly created AppWare Systems Group.

The company also released third-quarter results, reporting revenue of $273 million for the quarter ended July 31, up 12% compared with the same period last year. Net income was $62 million, down from $66 million in the corresponding period of last year. But the company actually posted a loss for the quarter of $225,000 due to a onetime write-off of expenses incurred from the acquisition of Fluent, Inc., Serius Corp., Software Transformation, Inc. and Unix System Laboratories, Inc.

Markey wants Allen committed. In the wake of the AT&T/McCaw Communications, Inc. merger, Rep. Edward Markey (D-Mass.) wants AT&T to "commit not to bundle equipment with services" in the cellular market. Markey's demand singles AT&T out for restrictive treatment since the Federal Communications Commission made bundling of cellular services and equipment legal in June of last year. A spokesman for AT&T said the carrier will respond by Sept. 7 to all questions raised by Markey.

ATM test lab in the works. Bell Communications Research is building an Asynchronous Transfer Mode (ATM) test lab that will enable vendors to check how well their products work with equipment from other suppliers. The Bellcore ATM Interoperability Lab will be open to any company that manufactures ATM products, and subscriptions to the lab will be available for six-and 12-month periods. Users interested in the test results can subscribe to a newsletter published by Bellcore. Contact Steve Holmgren at (908) 758-2489 or via the Internet at s.holmgrencc.bellcore.com.

Let's get unplugged. PacTel Cellular's Wireless Data Division and Electronic Data Systems Corp.'s wireless division will work together to develop customized wireless data applications for large companies, as well as low-cost, mass-market applications for use in field service, sales force automation, point-of-sale, transportation and mobile computing.

Net management companies team up. Legent Corp. last week signed a letter of intent to purchase Networx, Inc., a Bellevue, Wash., developer of trouble-ticketing software for network management systems. The acquisition is subject to approval by the two companies' boards of directors, and terms were not disclosed. Legent said the acquisition of Networx and its trouble-ticketing system, Paradigm, will help the company extend its mainframe-based systems management products into client/server environments.

Contacts

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Network HELP desk

Network World tracks down answers to your questions regarding products, services, technologies or disputes with vendors. Please submit questions to Susan Collins at (800) 622-1108, via fax at (508) 820-3467 or via Internet at scollins@world.std.com.

***Network World* received inquiries from several readers looking for tips on upgrading from Novell, Inc. NetWare 3.11 to NetWare 4.0.**

Ronald Nutter, escalation manager of 900 Support, an around-the-clock Novell technical support company in Lake Oswego, Ore., offers these tips:

First, do not name your server by using the same name as an organization or organizational unit. With 4.0, the consequences of this are worse than with 3.11. Directory services in 4.0 will not work properly, and the server, even if you can access it, will not respond correctly.

Also, in 4.0, if you are running multiple servers in the same domain, do not change anything to do with configuration of the server (for example, server name and IPX network numbers). This will cause irreparable damage to NetWare Directory Services (NDS), a new 4.0 feature, and will force you to reinstall from scratch all 4.0 servers in that domain. The DS Repair NetWare Loadable Module (NLM) will not even fix the problem once the server configuration information has been changed on the network.

I would also recommend that you install 4.0 as if you are not upgrading from another version of NetWare. This will give you an idea of how autoexec.ncf — the file that loads the LAN drivers and sets up the server environment for the network to use — works in NetWare 4.0. There have been significant changes in autoexec.ncf since 3.11.

I also strongly recommend you get Novell's white paper on planning and installation of NetWare 4.0, as well as its April 1993 edition of NetWare Application Notes, which covers NetWare 4.0 concepts and terminology. You can order these documents by calling Novell at (800) 638-9273.

In addition, there are several Novell Authorized Education Center classes currently available that should also help make your transition a smooth one. The first course I would recommend is the three-day NetWare 3.11 to 4.0

See **Help desk**, *page 52*

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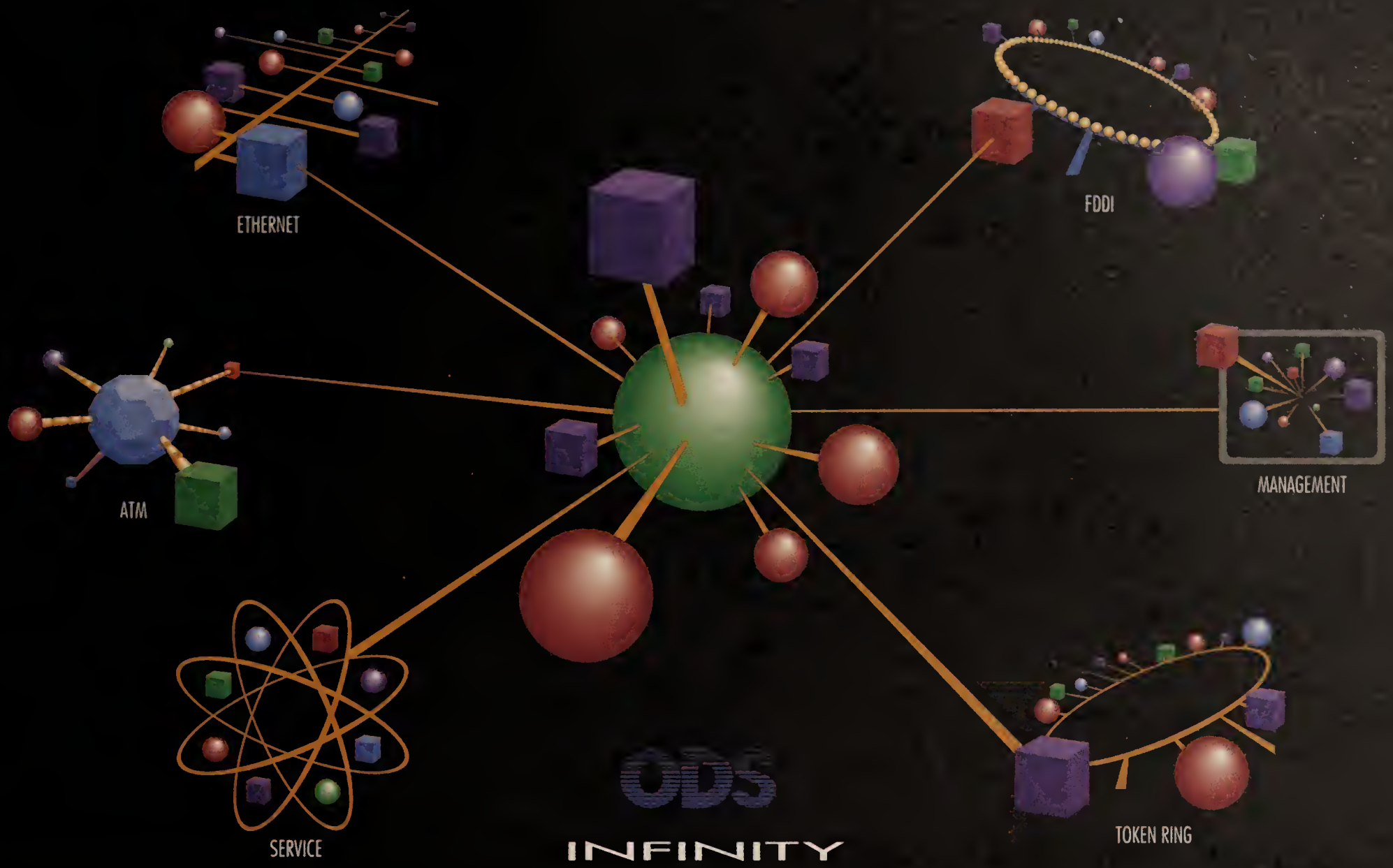

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McDATA gateway links LANs to hosts via TCP/IP

BY CARYN GILLOOLY

Broomfield, Colo.

McDATA Corp. last week brought out three new products that will let customers connect NetWare- or Unix-based LANs to IBM mainframes over an internetwork backbone.

McDATA's Advanced SNA/IP Gateway, X-Direct tn3270 Server and X-Direct tn3270 Client packages will let customers connect local-area networks to a host over a Transmission Control Protocol/Internet Protocol network rather than an IBM Systems Network Architecture backbone.

"This product is designed for people who are already doing 3270 terminal emulation," McDATA's Cormier said.

The Advanced SNA/IP Gateway is a NetWare Loadable Module (NLM) that works in conjunction with Novell, Inc.'s NetWare for SAA host connectivity software.

When a NetWare user needs mainframe access, NetWare for SAA translates traffic in Novell's Internetwork Packet Exchange (IPX) to IBM's Logical Link Control (LLC).

The Advanced SNA/IP Gateway intercepts the LLC traffic and translates it into IP traffic that can be routed over a wide-area TCP/IP backbone. At the mainframe, another McDATA gateway translates the IP packets into SNA format.

Without the McDATA gateway, NetWare for SAA users can make only a bridged connection between the server and the host because LLC is not a routable protocol.

"This product brings routability to NetWare-to-mainframe communications," said Larry Cormier, director of marketing for McDATA, based here.

The X-Direct tn3270 Server and X-Direct tn3270 Client serve similar translation purposes as the Advanced SNA/IP Gateway but are designed for Unix environments. The products work in conjunction with 3270-emulation software on a Unix client or server and translate 3270 packets into IP packets for routing over a TCP/IP backbone.

"This product is designed for people who are already doing 3270 terminal emulation," Cormier said. "This lets you consolidate all the 3270 traffic and send it out over a native TCP/IP link."

The Advanced SNA/IP Gateway will be available in the first quarter of 1994 for about $1,500, although prices may vary based on the number of users supported.

X-Direct tn3270 Server will be available next month for $3,995, which includes support for as many as 256 concurrent logical sessions. The X-Direct tn3270 Client is available now for $495.

✆McDATA: (800) 545-5773.

Oracle to embrace multiprocessing, announce enterprise messaging

BY PETER LISKER

Redwood Shores, Calif.

Looking to generate some excitement at the upcoming International Oracle User Week, Oracle Corp. will announce multiprocessing enhancements to the Oracle7 database and unveil an enterprise messaging facility that will serve as a foundation for work flow and mail-enabled applications.

Oracle officials at last week's INTEROP 93 August conference said the enhancements to Oracle7 will bolster support for client/server applications in local-area network environments by enabling users to take advantage of multiprocessing systems based on standard microprocessors rather than specialized high-end machines or clustered systems.

While the company was sketchy on details, it confirmed that the enhancements will be unveiled on Sept. 28 at the user meeting in Orlando, Fla., where the company is also expected to introduce an upgrade to Oracle Mail dubbed Oracle Office. That offering will be positioned as an enterprise messaging server that is tightly coupled with Oracle7 and supports not only electronic mail, but work flow and other applications.

"Support for parallel processing will be a boon to users engaged in data warehousing application development," said David Knight, senior marketing manager for Oracle's Server Products group. Knight said such applications, which include decision support systems, pull together large amounts of data from disparate sources.

Knight said the company will extend parallel processing capabilities to systems from companies including Compaq Computer Corp., IBM and NCR Corp.

Oracle has been an ardent supporter of parallel processing since Oracle 6.2, though the company has yet to make the technology really accessible for common applications. It currently provides multiprocessing capabilities for such high-end environments as Digital Equipment Corp. VAXclusters.

Knight said Oracle next month will discuss whether to provide new tools to ease the development of software for multiprocessing systems — a tough task.

OFFICE POLITICS

Along with the Oracle7 enhancements, Oracle will finally introduce Oracle Office, which a source close to the company described as "the fundamental messaging component of Oracle's enterprise work group strategy." The company has hinted at the product's capabilities over the past several months.

The server-based Oracle Office will support clients including Apple Computer, Inc. Macintoshes, DOS and Windows machines and systems running the Open Software Foundation, Inc.'s Motif.

Using the capabilities of Oracle7 and Oracle's text retrieval software, Oracle Office will be able to handle a variety of data types as messages including text, video, audio and images.

Database capabilities such as triggers and stored procedures will enable applications built to Oracle Office to exchange information in message format — for instance, enabling an inventory application to kick off an electronic data interchange order when supplies get low. The application could also be set up to message an end user about certain changes.

Applications written to the Oracle Glue application program interface (API) or other mail APIs will be able to use Oracle Office as a message engine.

Oracle Office will be scalable to the many machines that support Oracle7 and will interoperate with systems such as Unix mail and Novell, Inc.'s Message Handling Service. Later enhancements are

See **Oracle**, *page 73*

Line between telecom and CATV begins to blur

Bell Atlantic wins court case allowing it to compete for cable business.

BY BILL BURCH

Washington, D.C.

In a ruling with broad impact on the telecommunications and cable television businesses, a U.S. District Court judge in Alexandria, Va., gave Bell Atlantic Corp. the green light to provide video programming within its territory.

Prompted by a lawsuit from Bell Atlantic's Virginia operating company, Judge T.S. Ellis III said the 1984 Cable Act was an unconstitutional infringement on the regional Bell holding company's First Amendment right to free speech.

The act had barred local exchange carriers from owning cable companies within their own territories.

If it is not overturned on appeal, the decision to lift the restriction would ultimately let the local exchange carriers offer information content, not just the pipe through which it is delivered.

In issuing the ruling, Ellis cited cable companies' current market power, pointing out that cable television is now available to 96% of U.S. homes and that roughly 60% of all homes subscribe.

As for fears of local exchange carriers monopolizing control of the local loop and the potential for cross-subsidization from regulated services to video programming, Ellis said such occurrences could be prevented.

"There is neither evidence in the record nor any convincing argument to suggest that standard methods of regulation would be ineffective to control anticompetitive activities by the telephone companies in the video programming market," Ellis wrote.

On Capitol Hill, Ed Markey (D-Mass.), chairman of the House Subcommittee on Telecommunications and Finance, was not as sanguine about the ability of the current regulations to cope with phone company entry into cable programming. Markey said Congress should pass legislation to bar local exchange carriers from purchasing cable systems in their own territories.

But fellow subcommitte member Rick Boucher (D-Va.) welcomed the court decision and said all service providers should be allowed into the market.

Saying Ellis' decision could be tied up in appeals for years, Boucher sought support for legislation he is sponsoring to repeal the cross-ownership ban.

The case began when Bell Atlantic contacted the city of Alexandria in 1992 for permission to compete against Jones Intercable, the area's sole cable supplier.

The RBHC was eager to build a broadband network to provide video dial tone in the area.

Once the network was completed, Bell Atlantic said it would allow its Bell Atlantic Video Services Co. and other businesses to offer programming over the network.

But the Alexandria city attorney said no license could be granted because of the 1984 Cable Act, and in December, the company asked Ellis to overturn the ban.

Free from the prohibition, Bell Atlantic promised it would enhance its telephone network to carry several hundred channels of video programming.

With Ellis' decision now in its pocket, Bell Atlantic needs approval from the Federal Communications Commission, the state of Virginia and local authorities before it can build its network.

Assuming the carrier receives regulatory approval, it estimates it can complete the network in a year and a half.

Bell Atlantic also has other broadband projects under way.

In Virginia, the company is testing asymmetric digital subscriber line technology, which allows data transmission over today's copper phone lines at rates up to 7M bit/sec.

In New Jersey, the carrier has already received state approval for a broadband network it plans to install over the next 18 years.

First Internet services over cable TV connection.

BY ELLEN MESSMER

San Francisco

Continental Cablevision, Inc. and commercial Internet provider Performance Systems International, Inc. (PSI) last week announced plans to offer Internet access services via cable television links.

FELLOWS

In the first joint venture of its kind, the two companies plan to connect their networks and employ CATV facilities to provide Internet access at Ethernet speed.

The Internet service will initially be offered throughout the eastern part of Massachusetts early next year.

Pricing for the Transmission Control Protocol/Internet Protocol-based service will not be announced until closer to the time of the service rollout, so it is hard to estimate how big an audience the companies may find for "IP TV."

While customers will be able to access the service by simply outfitting their personal

See **Cable TV**, *page 72*

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Carriers detail advanced services

BY BOB WALLACE

San Francisco

While Sprint Corp. stole much of the thunder at INTEROP 93 August last week with the introduction of a nationwide ATM service, a handful of other carriers used the show to roll out advanced network offerings.

Pacific Bell became the first local carrier to detail plans for an Asynchronous Transfer Mode (ATM) service, while US West Communications, Inc. announced a Switched Multimegabit Data Service (SMDS)-based service for linking mainframes at channel speeds, and AT&T introduced a local-area net interconnection offering.

AQUILINA

"Carriers are providing a whole new wave of network services, ones users need to evaluate in drafting their long-range enterprise network strategy," said Daniel Briere, president of TeleChoice, Inc., a Verona, N.J., consultancy. "These services aren't vague promises anymore."

PAC BELL

Pacific Bell announced plans to offer an ATM service to users here by year end and to users in Los Angeles early next year. The as-yet unnamed service will be based on Newbridge Networks, Inc. 36150 MainStreet ATMNet switches linked with 155M bit/sec Synchronous Optical Network facilities.

Jose Verger, product manager for ATM and SMDS for Pacific Bell, said additional switches will be added as demand warrants.

A regional user group called the Bay-Area Gigabit Network, which primarily comprises universities and research firms such as Stanford University and Lawrence Livermore National Laboratories, drove Pacific Bell to offer an ATM service. "The last thing we wanted to do was just throw out an ATM service and hope that companies would swarm to it," Verger said.

The local carrier has not yet finalized pricing for the service.

In a separate development, Pacific Bell said it will provide fiber services and Newbridge Networks ATM switches to Hughes Aircraft Co. as part of an ATM pilot test at three Hughes facilities in Southern California and a fourth site in Virginia.

US WEST

US West Communications, Advanced Communications Services (ACS) unit announced a turnkey SMDS package targeted at users that need to link mainframe channels across town.

With the service, which is available now, US West will sell SMDS at T-3 speed — 34M bit/sec after overhead — along with channel networking equipment from Network Systems Corp., and data service units/channel service units from Digital Link Corp.

Firms can use SMDS at the lower speeds of 1.7M, 4M, 8M and 16M bit/sec, but performance will drop. Joe Zell, director of service development at ACS, said the channel networking package is available now to users in Phoenix, Portland, Oregon, Salt Lake City, Seattle and Des Moines, Iowa.

AT&T

AT&T was also active at the show, rolling out several new schemes customers can use to access the Internet and, as expected, a LAN interconnection service (*NW*, Aug. 23, page 116).

Beginning in the first quarter of 1994, customers of

SCOTT MCCORMICK

Overlooking entrance to INTEROP 93

AT&T's InterSpan frame relay offering will be able to access the Internet via a permanent virtual circuit at speeds from 300 to 14.4K bit/sec. Customers using AT&T EasyLink services to access the Internet will

See Carriers, *page 8*

Industry forums lay out standards

The Frame Relay Forum and the SMDS Interest Group met at INTEROP 93 here last week to update members on the progress of several pending specifications and to detail new contributions the groups will evaluate.

Of the Frame Relay Forum specifications discussed, the most notable one delineates how switch vendors can support switched virtual circuits (SVC).

With today's frame relay services, users have to establish permanent virtual circuits — essentially, point-to-point links — which can be difficult to cost-justify with light traffic.

SVCs enable users to establish switched connections between nodes on an as-needed basis.

Rajiv Kapoor, chairman of the Frame Relay Forum's technical subcommittee, said the specification has already been distributed to the forum's membership and is expected to be approved in a matter of weeks.

"Once this becomes an implementation agreement, CPE vendors will have no excuse for not supporting SVCs," Kapoor said. "And once [CPE vendors] support SVCs, the carriers will be able to offer this feature to users."

The Frame Relay Forum is also working with the ATM Forum to complete a specification that spells out frame relay/Asynchronous Transfer Mode (ATM) Interworking. This would enable carriers to convert variable-length frame relay frames into fixed-length ATM cells.

Later in the week, the SMDS Interest Group announced to its members that it is evaluating a plan that would enable local and long-distance carriers to support Switched Multimegabit Data Service over an ATM network.

This is important because most interexchange carriers and many local exchange carriers plan to gradually move to an ATM-based switching architecture, though only a few have detailed plans to offer SMDS.

BY BOB WALLACE

Users at INTEROP go hunting for frame relay

BY NETWORK WORLD STAFF

San Francisco

Asynchronous Transfer Mode (ATM) dominated INTEROP 93 August, both in the number of vendors exhibiting wares and the number of users seeking to learn more about the technology.

An estimated 55,000 people flocked to the show to view the exhibited wares of about 550 vendors and to attend the 110 forum, conference and workshop sessions held on various internetworking topics.

"We're thinking of going to ATM to increase the speed of the net for file transfer, voice and imaging."

"We're trying to get a better understanding of ATM and some of the newer technologies that are out there," said Mike Widell, network operations manager at Alliant Techsystems, Inc. in Edina, Minn.

Don Baker, communications manager at GTE Government Systems in Mountain View, Calif., is interested in ATM as well as Integrated Services Digital Network. "We just bought a new PBX that's ATM- and ISDN-capable so we're trying to find out about it," Baker said.

The new PBX will be delivered in November, at which time GTE Government System will be ready to deploy ATM, Baker said.

Another ATM watcher is Daniel Cota, computer support technician at Pillsbury, Madison and Sutro, a San Francisco law firm.

"We're thinking about going to ATM to increase the speed of the network for file transfer, voice and imaging," Cota said.

Some users attending INTEROP 93 were interested in other internetworking technologies, such as frame

See INTEROP, *page 72*

New SunNet Manager 2.2 shines with SNMP2 support

BY JIM DUFFY

Sun Microsystems, Inc.'s SunConnect unit last week unveiled Release 2.2 of SunNet Manager, which includes support for Version 2 of the Simple Network Management Protocol (SNMP) and other new features.

SunNet Manager is SunConnect's SNMP-based network and systems management platform that allows users to perform fault isolation, diagnosis, network monitoring and control from a graphical user interface. It runs on Sun workstations under the Solaris 2.X operating system.

With support for SNMP V.2, users will be able to conduct bulk data transfers of management information between the console and managed agents, and receive critical data from agents through traps instead of polling.

Release 2.2 also includes easier installation and configuration, automated options for data requests, enhanced discovery capabilities and improved graphical representation of managed resources.

Stephen Borcich, product development manager at SunConnect, said the new product features move the company toward cooperative management, while SunNet Manager will be able to work with IBM's NetView, Novell, Inc.'s NetWare Management System and other platforms to manage a heterogeneous enterprise network. But the manager-to-manager SNMP V.2 capabilities needed to make cooperative management a reality will not be added until a future release.

Other new features in this release include an enhanced discovery capability that allows users to choose between a "full discover" and a "local discover" capability. Full discover provides a view of the entire network while local discover offers just a segment view on SunNet Manager's graphical map.

In addition, SunNet Manager can automatically "rediscover" the network whenever a node is added or subtracted.

Another enhancement is the ability to automate repetitive data and event requests. And SunNet Manager 2.2 also includes new icon representations that make it easier to represent managed resources on the graphical map.

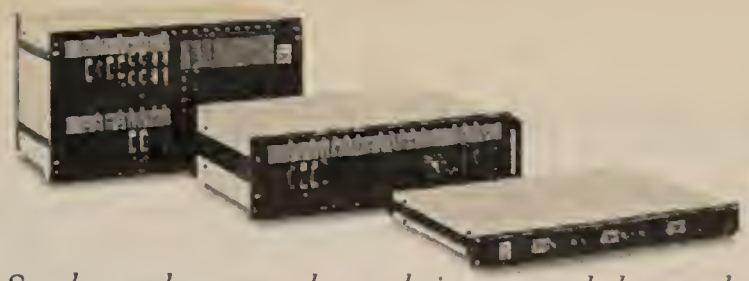
Version 2.2 also allows users to monitor the lines that connect their routers, hubs and other network interface devices.

Previously, it could only monitor the devices themselves. And for devices that have multiple network interfaces, Version 2.2 allows users to define "aliases" for those devices, so they can monitor each connection as if it were attached to a separate device.

In keeping with SunConnect's cooperative management theme, Nynex Allink Co. and ISICAD, Inc. disclosed plans to establish manager-to-manager communications with SunNet Manager. Nynex Allink, for example, will define a new application program interface for its Allink operations coordinator platform that will enable users to access SunNet Manager via SNMP V.2.

SunNet Manager 2.2 will be available in October for $3,995.

✆SunConnect: (800) 241-2669.



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Vendors show off wares at INTEROP

BY NETWORK WORLD STAFF

San Francisco

E-MAIL CONSULTING

Soft•Switch, Inc., a Wayne, Pa., vendor best known for its host- and Unix-based electronic mail switches, announced Directory Xpress, a new consulting service for users looking to synchronize multiple E-mail and other directories.

Under Directory Xpress, Soft•Switch consultants will analyze a user's existing E-mail directories, recommend a way to synchronize them and offer to build the synchronization system for a fixed price. Soft•Switch will also provide users with a migration path to X.500-based directories. Directory Xpress is available now.

Separately, Soft•Switch officials said the company plans to announce a series of directory synchronization offerings for its Enterprise Mail Exchange (EMX) messaging switch in the first quarter of 1994. Soft•Switch has yet to offer such capabilities on EMX to date.

Also, Soft•Switch announced a facsimile server dubbed mailFax, which is available now. The PC-based fax server is designed to let users leverage their existing Soft•Switch E-mail backbones for sending faxes as well as E-mail messages from their desktop computers. The mailFax server consists of the mailFax application bundled with a Data General Corp. personal computer, which is based on an Intel Corp. 80486 processor and running the Unix operating system.

Soft•Switch will offer the product either as a turnkey package or allow users to supply their own hardware. The mailFax server can be linked to either the mainframe-based Soft•Switch Central messaging switch or the server-based EMX messaging switch on one side, and to one or more fax modems on the other side.

The mailFax software costs $7,500 by itself. A turnkey system supporting eight fax lines costs $16,500, while a turnkey system supporting 16 fax lines costs $21,500.

MESSAGING TEAM

Los Angeles-based **Isocor** and **WordPerfect Corp.,** based in Orem, Utah, said they will integrate their messaging products as part of a development, marketing and sales alliance. That will entail linking Isocor's 1988 X.400-based Isoplex messaging server with WordPerfect Office, an integrated E-mail and group scheduling system.

GROUP SCHEDULING

The **X.400 Application Program Interface Association (XAPIA)** decided to take on the job of developing group scheduling interoperability specifications following a meeting last Monday at which users and vendors encouraged the group to do so.

To spur participation in the group scheduling effort and other XAPIA activities, the organization decided to introduce a new level of membership aimed at small companies and users that may only be interested in particular issues, such as group scheduling. The new membership level, associate membership, will cost $2,000 per year per company and will allow for technical participation. Full membership costs $5,000 annually and includes voting rights.

COMMERCIALIZING INTERNET WARES

Qualcomm, Inc., a San Diego firm best known for its digital wireless technology, last week announced that it has commercialized and enhanced Eudora, a popular E-mail package available via the Internet.

Eudora by Qualcomm, like the Eudora E-mail client software found on the Internet, connects directly to Transmission Control Protocol/Internet Protocol nets and uses the Simple Mail Transfer Protocol. The client software works with existing E-mail servers attached to TCP/IP nets.

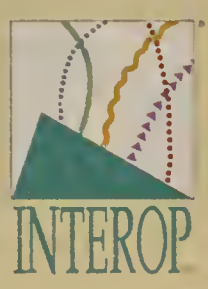
Unlike the Internet version, which is available only for Apple Computer, Inc. Macintoshes, Eudora by Qualcomm will offer both Macintosh and Windows versions. Qualcomm is also offering advanced features, such as message filtering, not found in the Internet version.

Eudora, which was developed at the University of Illinois, has been available on the Internet for several years and will continue to be available there free of charge. The Macintosh version of Eudora by Qualcomm will be available next month, while the Windows version will be available in the fourth quarter. The software will cost $150 per user for up to nine users, $45 per user for up to 49 users and $32.50 per user for up to 999 users.

ROUTING AT THE BOUNDRY

As expected, **Ascom Timeplex, Inc.** unveiled its new low-end Integrated Access Node (IAN), a device that performs routing and supports X.25 and frame relay links (*NW,* Aug. 9, page 11).

The IAN, which is essentially a scaled-down version of Ascom Timeplex's recently introduced Enterprise Router, melds the functions of the company's existing Access Router and X.25 Nodal Processor. It can consolidate IBM Systems Network Architecture and local-area network traffic over frame relay or X.25 circuits in what the company calls a connection-oriented routing architecture (COR). COR lets users dedicate bandwidth to legacy traffic such as SNA data and isolate that from nondeterministic LAN protocols.



Like the Enterprise Router, IAN will support token-ring and Ethernet LANs and, on the wide-area side, X.25, frame relay and serial ports up to T-1 speeds. It supports all the major protocols, including TCP/IP, Novell, Inc.'s Internetwork Packet Exchange (IPX) and DECnet. It also supports IBM protocols such as SNA, Synchronous Data Link Control and Binary Synchronous Communications.

The IAN will be available by year end and costs between $5,000 and $14,500, depending upon configuration.

LAN ACCESS SERVER

IBM and **Shiva Corp.** have teamed up to develop an access server that will let remote users communicate with corporate networks based on IBM technology. The new offerings will be based on Shiva's existing LanRover for NetWare products for Ethernet and token-ring environments. Those products enable customers to dial in to LANs to access file servers, E-mail and network applications.

LanRover for NetWare already supports DOS and Windows clients as well as IPX and TCP/IP links. The new products will add support for OS/2 clients, the IEEE 802.2 data link-layer standard and the Network Basic I/O System.

Jay Batson, an analyst at Cambridge, Mass.-based Forrester Research, Inc., said the deal will benefit both Shiva and IBM. Having a remote access server for OS/2 better positions IBM against Microsoft Corp., whose Windows NT operating system has built-in remote access capabilities. Most network managers want to administer that function from a central location, according to Batson.

The companies will officially announce a product, along with details, next month.

SynOptics, Novell strike strategic net alliance

To integrate product lines, share technology.

BY SKIP MACASKILL

San Francisco

Novell, Inc. and SynOptics Communications, Inc. last week announced a strategic alliance under which the capabilities of NetWare servers will be incorporated into SynOptics wiring hubs.

The long-term partnership, which was expected, is designed to help users migrate to new switching technologies such as switched Ethernet and Asynchronous Transfer Mode (ATM).

The long-term partnership is designed to help users migrate to switching technologies.

The first fruits of the union is the LattisEngine/486, an Intel Corp. 80486-based personal computer module for the SynOptics LattisNet System 3000 that functions as a Novell server. The module, which was codeveloped by Intel, will also be available in a stackable, stand-alone version to complement SynOptics' 2000 work group hub line.

LattisEngine/486 will give SynOptics users access to a range of NetWare services, such as Novell's Multiprotocol Routing (MPR), the NetWare for SAA Systems Network Architecture gateway as well as SNA Links software.

"The agreement is significant in that it melds SynOptics' expertise in the physical infrastructure of the net with Novell's leadership in the network operating system and net services areas," said Ron Schmidt, senior vice president and chief technical officer at SynOptics.

The most immediate benefit will be seen when integrating remote local-area networks and departmental LANs into campus and corporate networks by using the MPR and SNA gateway applications, according to Andy Ludwick, SynOptics' president and chief executive officer.

In addition to the router and gateway functions, the Simple Network Management Protocol-based LattisEngine/486 will allow net administrators to control a variety of desktop devices as well as hubs and servers via several management applications. These applications include Intel's LANDesk SNMP Gateway, which provides detailed PC and desktop asset information, and Novell's LANalyzer, a protocol analyzer.

LattisEngine/486 has two front-panel Industry Standard Architecture slots as well as a Peripheral Component Interconnect slot, which is an Intel-developed local bus specification. The slots are used for PC adapter cards, which turn the module into a server platform.

Available in the fourth quarter, the LattisEngine/486 hub module, which takes up two slots in the 3000, costs between $5,000 and $8,000, depending on configuration. The stand-alone version, which falls within the same price range, will be available in early 1994.

With the nonexclusive partnership agreement, SynOptics becomes the first hub vendor to sign a Strategic Development Agreement (SDA) with Novell. Other companies with Novell SDAs include AT&T, Compaq Computer Corp., Intel, IBM and Sun Microsystems, Inc.

Two rival hub makers, Ungermann-Bass, Inc. and NetWorth, Inc., announced a deal with Novell in May 1992 to incorporate a Novell server into their devices (*NW,* May 11, 1992, page 1).

✆Novell: (801) 429-7000; SynOptics: (408) 988-2400.

Carriers

Continued from page 6

also benefit because the carrier now plans to route that traffic through its Interspan net for increased reliability.

The new LAN internetwork service is called Accuwan, a packaged offering that comes with private lines ranging in speed from 56K to 1.544M bit/sec, Wellfleet Communications, Inc. routers, support and net management.

With Accuwan, AT&T will design, provision, install, monitor and maintain customers' LAN internets. It will support Ethernet, token ring, Fiber Distributed Data Interface and other LANs, as well as protocols such as Transmission Control Protocol/Internet Protocol, Digital Equipment Corp.'s DECnet, Novell, Inc.'s IPX, Banyan Systems, Inc.'s VINES and Apple Computer, Inc.'s AppleTalk.

Accuwan customers will receive performance reports as well as quarterly capacity utilization reports. "Users will still want to know how their network is performing," said Robert Aquilina, a marketing vice president with the Accunet Data Communications Services unit.

Tiaj Kiani, product manager for Accuwan, said technicians at AT&T's Accuwan Management Center in Liberty Corner, N.J., will use a net management system to monitor LAN internets around the clock, seven days a week.

Accuwan is being offered on a monthly basis or on one- to five-year contracts with discounts ranging from 5% to 27%. Monthly charges follow a simplified pricing model based on wide-area network connections, speed and mileage. The service will be in controlled introduction in the fourth quarter of 1993, with general availability early next year.

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BRIEFS

Compatible Systems Corp. has announced the MicroRouter 1000R, an Ethernet dial-up router that supports wide-area speeds up to 112K bit/sec. The router can be linked directly to a leased line via a data service unit/channel service unit at speeds up to 64K bit/sec.

The MicroRouter 1000R supports Transmission Control Protocol/Internet Protocol, Internetwork Packet Exchange (IPX), AppleTalk, DECnet and the Point-to-Point Protocol. It will be manageable in-band via Telnet and Simple Network Management Protocol, while out-of-band Telnet management will be supported over an auxiliary serial port. That port can serve double duty as a dialing port for switched 56 services.

The router, which was demonstrated last week at INTEROP 93 Fall, will be available in the first quarter of next year. Pricing has not yet been set.

Compatible Systems: (800) 356-0283.

Gandalf Premier last week announced a family of so-called plug-and-play local bridges designed to segment work group personal computers and Ethernet local-area networks to curb congestion on a net backbone.

The LANLine 5210 and 5211 both support wire speed Ethernet packet-filtering rates and are equipped with automatic configuration and address learning capabilities. The 5210 is the size of an audio cassette and supports up to 256 users. It is powered from an Ethernet attachment unit interface (AUI) and can be installed in less than a minute, according to Gandalf. It costs $500 and is available now.

The 5211 supports up to 1,024 nodes and features both AUI and BNC connectors. It is available now and cost $895.

Gandalf: (613) 723-6500.

Xylogics, Inc. has announced Release 8.0 software for its Annex family of communications, terminal and printer servers that includes support for AppleTalk Remote Access (ARA) and dial-up routing capabilities.

ARA features include full AppleTalk network node capabilities for remote Macintoshes and PowerBooks, ARA Microcom Network Protcol/V42.bis modem technology and AppleTalk-password encryption. Other ARA features include AppleTalk Zone security, centralized password administration and audit trails. The remote dial-up routing capabilities, which provide internetworking for remote sites where leased lines are not cost-effective, enable any port on the Annex server to function as an Internet Protocol router and dial any destination.

Annex Network Software Release 8.0 is priced at $395 per site and is available now.

Xylogics: (617) 272-8140.

Wellfleet Communications, Inc. has been named the fastest growing company in the U.S. for the second consecutive year by *Fortune* magazine in its annual list of the 100 fastest growing public companies. Fortune reported Wellfleet's compounded annual growth rate to be 243%.

See **Briefs**, *page 20*

Advantis to build high-speed multiprotocol backbone

Plans to support multimedia apps, better services.

BY MICHAEL COONEY

Shaumburg, Ill.

Advantis, the IBM and Sears, Roebuck and Co. value-added network (VAN) venture, is preparing to move into the future by building a high-speed multiprotocol backbone capable of supporting new multimedia applications and improved voice and data services.

In an interview here, Advantis officials detailed how they plan to deploy the backbone by the end of the year using new IBM-developed high-speed routers. That network will be a stepping-stone to an Asynchronous Transfer Mode (ATM) backbone the company expects to move to within the next three years.

IBM and Sears formed Advantis last August. From the start, it was one of the world's largest VAN companies, offering outsourcing, custom net design and a variety of other networking services to more than 10,500 users.

"Building the high-speed multiprotocol backbone is at the heart of our overall strategy," said Syd Heaton, chief executive officer and chairman of the Advantis board. "We will also be placing a heavy emphasis on improving our wireless communications services and helping users support multimedia applications."

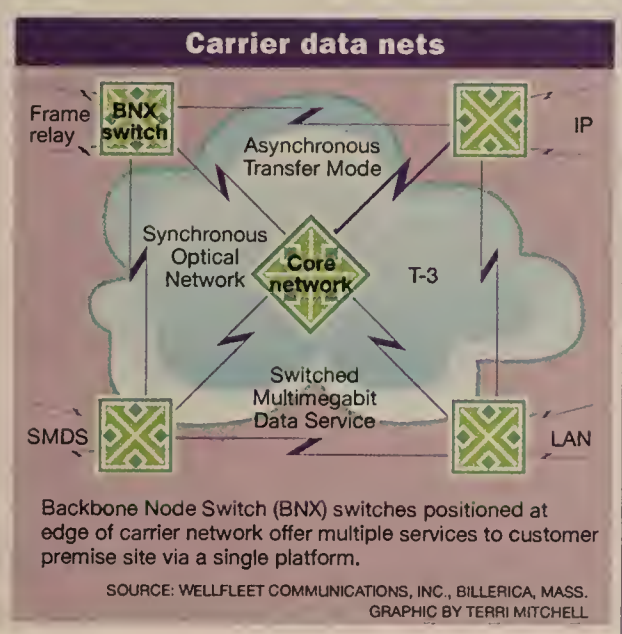
Advantis will begin deploying its high-speed backbone by installing specially developed IBM routers that can handle 45M bit/sec T-3 speed connections. The routers, which are not available commercially, will be built on IBM's RISC System/6000 platform, have multiple T-3 interface cards installed and use some Advantis-designed code.

The routers are capable of handling 45M bit/sec at up to 20,000 packet/sec for each T-3 interface. IBM's existing 6611 router can handle up to 1.54M bit/sec T-1 lines. The routers, which are expected to be installed in 20 cities by year end, will sup-

See **Advantis**, *page 17*

TIM SCHNEIDER

Syd Heaton, Peter Hicks of Advantis



Backbone Node Switch (BNX) switches positioned at edge of carrier network offer multiple services to customer premise site via a single platform.

SOURCE: WELLFLEET COMMUNICATIONS, INC., BILLERICA, MASS.
GRAPHIC BY TERRI MITCHELL

Wellfleet enters carrier access switch market

BY MAUREEN MOLLOY

Billerica, Mass.

Wellfleet Communications, Inc. has expanded its reach outside the LAN interconnection arena with the announcement of an access switch for carriers that supports a variety of wide-area network services, including frame relay, SMDS and ATM.

The Backbone Node Switch (BNX) is a souped-up version of Wellfleet's high-end Backbone Node router and is designed to enable local and interexchange carriers to offer users simultaneous access to multiple services from a single platform. That promises to make it easier and faster for carriers to roll out new data services.

First-user MCI Communications Corp. has already deployed a spate of BNXs throughout its net-

See **Wellfleet**, *page 16*

NET enhances ATM hub, supports virtual LANs

BY MAUREEN MOLLOY

Redwood, Calif.

Network Equipment Technologies, Inc. (NET) last week added a capability to its ATMX Asynchronous Transfer Mode (ATM) work group hub that will enable users to create so-called virtual LANs across geographically dispersed locations.

The vendor also announced 45M bit/sec T-3 and 155M bit/sec Synchronous Optical Network (SONET) interfaces for the hub as well as a worldwide service and support program for ATM nets.

The ATMX is a local-area switch equipped with a 1.2G bit/sec backplane that supports as many as 15 ATM interfaces, each of which has a maximum capacity of 100M bit/sec shared across six ports.

The new enterprisewide virtual local-area network software allows users to create virtual work groups regardless of the physical location of the individual nodes. In addition to removing physical LAN wiring constraints, the software enables net managers to centralize servers, thereby simplifying network administration and management.

In addition to providing automatic network moves, adds and changes across geographic locations, the virtual LAN feature preserves bandwidth by limiting broadcast overhead over the wide area to the destination nodes within a virtual LAN.

The virtual LAN software will be available in October as a free software upgrade.

HIGH-SPEED INTERFACES

The new ATM Forum-compliant T-3 and SONET interfaces for the ATMX will provide links between ATMX switches in both local- and wide-area networks. The T-3 and SONET interfaces, which will be available in the first quarter of next year, will support between two and four ports. Pricing is $3,000 per port.

NET's new ATM service and support program, dubbed ATMXpert Services, includes global on-site support, a technical hot line that operates 24 hours a day, seven days a week, and weekly customer satisfaction surveys.

If a critical network problem arises, an NET Technical Assistance Center supervisor is alerted less than 30 minutes after the problem is reported. If the problem remains unresolved after 10 hours, NET's chief executive officer is notified.

The new support program is available now. Pricing depends upon the customer's net configuration and requirements.

Finally, NET also announced a software licensing agreement to furnish its ATMX software to National Semiconductor Corp., which National will use

See **NET**, *page 16*

Announcing the first network printer

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*Standard in the HP LaserJet 4SI MX printer. **For operating HP-UX, SunOS or Solaris, a one-time purchase of $199 in configuration software is required. Adobe and PostScript are trademarks of Adobe Systems Inc. which may be registered in certain jurisdictions. Microsoft is a U.S. registered trademark of Microsoft Corporation. UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries. †In Canada call 1-800-387-3867, Ext. 7299.

Multiple environments are no longer worlds apart. Even if you have Novell Netware on one network, HP-UX on another and EtherTalk on a third, the new HP LaserJet 4Si MX printer easily connects across platforms. Automatically.

The HP LaserJet 4Si MX printer comes out-of-the-box preconfigured for multiple environments. There's nothing more to do than plug-and-play. All interfaces are simultaneously hot, making switching so seamless, end-users won't even notice.

What's more, HP's LaserJet 4Si MX printer is ready to handle whatever needs come down the

that adapts to multiple environments.

pike. More operating systems? No problem. As your network system continues to evolve, the capabilities of this printer are no longer just impressive. They're indispensable.

The HP LaserJet 4Si MX printer is loaded with features that define state-of-the-art. HP's enhanced PCL5 and genuine PostScript™ Level 2 software from Adobe™ come standard. Printer environments are saved while switching. Setup is a cinch with network software utilities and drivers included in the box. And, if you need any reassurance about trouble-free operation, you have it in our Simple Network Management Protocol (SNMP) support.

At 17 ppm, this is the fastest LaserJet ever, with I/Os and RISC-based formatter capabilities matched to support its speed. It delivers impeccable 600 dpi print quality—thanks to HP's microfine toner and Resolution Enhancement technology. Plus, it comes standard with two 500 sheet input trays.

But what if you don't need the full capabilities of the HP LaserJet 4Si MX printer right away? HP offers another printer that's probably a perfect fit. The HP LaserJet 4Si printer delivers the identical 17 ppm performance and superb 600 dpi print quality. It also has room to grow. The two MIO expansion slots let you add HP JetDirect network interface or third party cards. And you can add on Adobe's genuine PostScript Level 2 software and SIMM memory modules, as you need them.

To find out more about the multiple-network HP LaserJet 4Si MX printer and the upgradable HP LaserJet 4Si printer just call 1-800-LASERJET, Ext. 7299.† Capabilities this advanced make a world of difference—in any environment.

HEWLETT PACKARD

INTERNETWORKING MONITOR

by Scott Bradner

'Not invented here' as corporate culture

A while back I talked about the types and importance of standards. Well, I'm not done yet, for there is more. (For you literary folk, that last phrase is a quote.)

One thing I didn't mention last time is that standards protect the buyer. They can ensure that products purchased from various sources or at various times will be compatible.

At least that's the theory.

If there are too many options embodied in the standard, this guarantee of interoperability can fall short. One vendor can pick a set of options that doesn't match the set picked by another vendor. Both vendors can claim compliance to the standard and yet their products won't be interoperable.

The Open Systems Interconnection standards often exhibit this problem. For example, interoperability between versions of X.400 was a problem for quite a while because of the extensive array of optional X.400 features.

A number of governments have tried to reduce incompatibilities by issuing an options checklist for these protocols. In the U.S., this checklist is known as the Government OSI Profile, better known as GOSIP. Purchasers of "OSI-compliant" products would do well to insist on GOSIP compliance in addition.

In addition to the problem of options, a standard is only as good as its acceptance. There are numerous reasons a standard may not play in the marketplace, from the simple case where it defines an unneeded or unwanted function to the all-to-common case where it is gibberish as written.

However, there is another reason some standards are not as widely adopted as they might be: the Not Invented Here syndrome adopted by some vendors. "If we didn't invent it, it cannot meet our needs," the thinking goes. Some companies also fear the open marketplace and create their own "standards" in an attempt at product differentiation.

Historically, Novell could be found in this camp. For example, Novell created its own protocol rather than use any of the standard ones. On this front at least, Novell is coming around. The company is adding much better support for Transmission Control Protocol/Internet Protocol, even for client-to-server interaction.

But Novell hasn't completely chosen the open path. It recently introduced NetWare Link Services Protocol, a new routing protocol that solves a number of problems associated with building large Novell internets but is almost indistinguishable from the international standard routing protocol Intermediate System to Intermediate System (IS-IS).

The vendor most regularly exhibiting the Not Invented Here syndrome is Apple Computer, Inc. I've mentioned Apple's reluctance to support TCP/IP in this column before, but an even better example is the much anticipated Apple Open Collaboration Environment (AOCE).

AOCE contains a lot of "almosts." Its security is almost the same as the Open Software Foundation, Inc.'s Distributed Computing Environment (DCE). If AOCE was DCE, Macintoshes (like the one I'm writing this column on) could be part of a corporate distributed computing environment involving computers from a dozen other vendors.

Apple claims it will (eventually) produce AOCE interfaces to other systems, but why should we have to wait for Apple to program software for an IBM mainframe?

Standards, by the nature of their adoption process, do not answer every need for every vendor. Even so, those vendors who embrace standards grow the market for their products. Consider TCP/IP and Unix. This writer wishes that Novell and, especially, Apple would learn that lesson.

My disclaimer of the month is for the C programmers among you and comes from many sources: #include <std-disclaimer.h>

Bradner is a consultant with Harvard University's Office of Information Technology. He can be reached via the Internet at sob@harvard.edu.

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INTEROP 93

General DataComm unveils spate of new wares

BY MAUREEN MOLLOY

San Francisco

General DataComm, Inc. (GDC) announced several new products at INTEROP 93 August last week, including two new data service units (DSU), an internetworking device that supports data, voice and video and LAN traffic over wide-area lines, and a new network management system for its T-1 equipment.

The company also announced it will resell CrossComm Corp.'s high-end ILAN XL 80 router as well as develop router modules for its T-1 multiplexers that are based on the CrossComm technology.

Targeted at users with occasional wide-area net requirements, the new pair of programmable 56K bit/sec DSUs, called the GDC Switched 56-2 and GDC Switched 56-4, provide access to two-wire and four-wire switched offerings, respectively.

In addition to switched links, the 56-4 DSU also supports a private-line interface. The private-line interface supports speeds of up to 56K bit/sec over Dataphone Digital Service or generic digital services, while a second interface provides the same bandwidth using four-wire switched 56K bit/sec services.

The 56-2 DSU supports full-duplex, synchronous data at speeds of up to 64K bit/sec and asynchronous data at speeds of up to 19.2K bit/sec. It provides direct access to two-wire circuit-switched digital services provided by Northern Telecom Datapath systems, including the DMS-100 central office and SL-100 private branch exchange switches.

Both DSUs are available now and cost $1,195 each.

GDC also announced a so-called office communications manager that integrates data, voice, video and imaging applications over common digital facilities.

The OCM-1000 is targeted at users that are migrating from analog to digital links and allows users to consolidate traffic from a remote site over a single high-speed network.

The device can support a total of 64 data or voice channels and trunk facilities, which include 56K bit/sec, fractional T-1 and T-1 links. The OCM-1000 can be managed through a DOS application running on any IBM-compatible personal computer, with as many as 31 pairs of OCM-1000s controllable by one PC.

Pricing for the OCM-1000 starts at $1,195. It is available now in stand-alone and rack-mountable versions.

GDC also unveiled its DMA-200 Management System, which provides integrated management of the vendor's line of T-1 DSU/channel service units via the Simple Network Management Protocol.

The DMA-200 is a module that can be integrated into a T-1 DSU/CSU and is equipped with an Ethernet, token-ring and point-to-point protocol interface, which enables an SNMP workstation to monitor up to 256 T-1 network elements. A dial backup connection can be added to the DMA-200 so that monitoring can be performed over the switched network if a T-1 link malfunctions.

The DMA-200 card costs $2,195 and will be available in November.

✆GDC: (203) 574-1118.

NET

Continued from page 11

to offer an Extended Industry Standard Architecture ATM adapter board.

The software will provide for LAN emulation — enabling existing LAN applications and protocols to operate over an ATM net — and the signaling required to set up virtual connections.

It will also include board drivers for Novell, Inc. NetWare, Microsoft Windows and Unix operating system environments.

The adapter board will be available in December. Pricing is not yet set but will not exceed $2,500, the company said.

✆NET: (415) 366-4400.

Wellfleet

Continued from page 11

work to support the carrier's Hyperstream frame relay service. Arthur Henley, MCI's vice president of data engineering, said different services typically require multiple access devices, but the BNX accommodates all MCI services and provides high-speed routing capabilities.

"We can leverage the product to handle the Hyperstream service, and there are plans to support [Switched Multimegabit Data Service]

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soon, among other things," Henley said. This capability is especially important as more users migrate from private to public wide-area networks, he added.

"Carriers build overlay networks within the cloud. The BNX provides carriers with a single switch that will support all of their services," said David Yates, Wellfleet's product marketing director.

The BNX supports all the major fast packet and cell-switching standards. In addition to frame relay services, the device supports SMDS, Asynchronous Transfer Mode (ATM), Transmission Control Protocol/Internet Protocol and native local-area network switching services. It can support as many as 624 DSOs and 52 T-1 lines, or 13 T-3 circuits.

The BNX supports ATM via an ATM interface over a T-3 network, and will move to Optical Carrier-3 (OC-3) rates of 155M bit/sec next year.

RANGING SUPPORT

The BNX will support a range of interface options including a dual-port T-1 module that is compatible with a variety of Federal Communications Commission, CCITT, Bell and AT&T standards.

The module will support as many as 60 DS0 channels per port and add an integrated data service unit/channel service unit (DSU/CSU) and bit error rate tester.

In addition, the BNX will support a quad-port synchronous link module with interfaces to V.35, X.21, RS-232, RS-449, High Speed Serial Interface and Fiber Distributed Data Interface.

Wellfleet added a T-1 card that is equipped with an integrated DSU/CSU, thereby eliminating the intermediate step required to support multiple DS0 links.

Another modification to the BNX is the addition of Wellfleet-developed management and billing software that has enabled MCI to add distance- and usage-sensitive frame relay pricing options to its Hyperstream Frame Relay service, thereby making MCI's frame relay service more economical (*NW*, Feb. 1, page 1).

Previously, users had only fixed-rate options with or without guaranteed bandwidth, known as a committed information rate.

The switch's statistic, configuration and control parameters are maintained in a standard Simple Network Management Protocol format.

The switches will be available in two models: the Backbone Link Node Switch and the Backbone Concentrator Node Switch.

Both are available now with frame relay. SMDS, ATM, TCP/IP and native LAN Switching will be available within the next 12 months.

✆Wellfleet: (508) 670-8888.

Advantis

Continued from page 11

port a variety of wide- and local-area network protocols, from Systems Network Architecture and Transmission Control Protocol/Internet Protocol traffic to Network Basic I/O System and Novell, Inc.'s Internetwork Packet Exchange (IPX).

The routers were first developed for and tested on the National Science Foundation Network, the nationwide network that serves as a key part of the backbone for the Internet.

ROAD TO ATM

Ultimately the high-speed routers will feed into a new ATM backbone Advantis expects to have operational by 1995 or early 1996. Advantis will be beta-testing IBM's new Transport Network Node backbone ATM switch this fall.

According to Syd Heaton, CEO and chairman of Advantis, the firm is on course to earn about $1.3 billion in its first year.

"ATM will help us provide the ability for a user to support many different types of applications through a single network interface from the customer's location into the Advantis network," Heaton said.

Peter Hicks, vice president of premise computing and custom network solutions for Advantis, said the company will also "offer services to help users move from their legacy equipment to multiprotocol local- and wide-area interconnected networks."

Heaton said wireless will also figure prominently in the company's plans.

"We've seen an explosion in the amount of users who want wireless communications access to the Advantis backbone, so we will be improving our services there as well. We want users to be able to support large volumes of wireless communications in their networks."

Advantis now supports wireless communications through a gateway to IBM and Motorola, Inc.'s Ardis wireless network. "What we want to do with Ardisnet is create a commercial internet, where users can have access to a high-speed backbone and build high-bandwidth applications," Heaton said.

When it comes to high-performance hubs, the new DEChub™ 900 MultiSwitch is a whole different animal. For starters, it is the only hub with a technology-independent backplane that supports up to eighteen separate LAN segments, including Ethernet, Token Ring or FDDI in any slot. And it's ATM-ready today.

The DEChub 900 MultiSwitch ensures your network can handle future growth and changes. Over 3GB of throughput gives you all the bandwidth you'll ever need to send anything, anytime.

The DEChub 900 MultiSwitch is the most flexible and cost-effective hub around. DEChub 900 modules, as well as the award-winning DEChub 90 modules, all work as single units or snapped into the DEChub 900 MultiSwitch backplane. And all DEChub modules are truly "smart" —just power them up and they know what to do.

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BRIDGES

Data Race targets remote sites with E-net bridge module

BY MAUREEN MOLLOY

San Antonio, Texas

Data Race, Inc. unveiled at INTEROP 93 August last week a remote Ethernet bridge module for its Mach DS plus multiplexer, a device that makes it possible to integrate data, voice and facsimile traffic over a wide-area link.

The company also announced several cost-saving features for its Mach DS plus mux, including compression, the ability to support multiple 128K bit/sec wide-area links and an integrated modem.

When added to the Mach DS plus, the new Mach net bridge module lets users link remote Ethernet local-area networks using the same wide-area net facility used to support other traffic.

For example, sites that previously employed dial-up lines for voice and fax traffic can now merge that traffic with bridged LAN data over a leased line, shaving communications costs by eliminating the need for multiple dial-up circuits.

The two-port bridge supports full Ethernet bridging of 14,880 packet/sec for 64-byte packets at wide-area speeds up to 128K bit/sec and is available in two models: an attachment unit interface/10Base-T connector for net devices or twisted-pair nets, and a 10Base-2 connector for linking to thin-wire coaxial nets.

The models cost $1,195 each and will be available in October.

In addition to the new bridge module, Data Race has doubled the capacity of its WAN modules to 128K bit/sec. Previously, the modules supported a maximum speed of 64K bit/sec. The higher WAN speed will enable the Mach DS plus to better accommodate voice, fax/data and LAN traffic.

Data Race also announced the addition of integrated 14.4K and 19.2K bit/sec modems as a second cost-saving feature. The modems, which come equipped with an auto-dial backup capability, cost $995 for the 14.4K bit/sec model and $1,795 for the 19.2K bit/sec model. Both will be available by year end.

Lastly, a voice compression capability was added to the Mach DS plus that will allow users to select from two ranges of settings — 4.8K to 8K bit/sec and 8K to 13K bit/sec — to obtain the amount of bandwidth and voice quality desired.

The enhanced compression will be available in October on all Mach DS plus units at no extra charge.

✆Data Race: (210) 558-1900.

BRIEFS

Continued from page 11

Global Enterprise Services, Inc., the Princeton, N.J.-based owner and operator of the John von Neumann Computer Network (JvncNet), last week announced that it has added nodes in Washington, D.C. and Hayward, Calif., for high-speed connection to the Internet. The California node makes JvncNet an operational member of the Commercial Internet Exchange.

For more information, call (609) 897-7316.

NetSoft recently upgraded its Windows-to-Application System/400 connectivity software with improved file-transfer capabilities and twinaxial cable connections.

The additions are included in Version 3.0 of NetSoft's Elite/400 Intelligent Workstation (IWS) and Elite/400 Display Station Passthrough (DSP) software packages. With the file-transfer enhancements, NetSoft claims Version 3.0 of its Elite/400 IWS software transfers files 50% faster than IBM's PC Support Version 2.2 client software.

With support for twinaxial cable connections, NetSoft users can now attach to the AS/400 using a variety of twinaxial adapters from IBM and third parties.

Other enhancements include support for Novell, Inc.'s Sequenced Packet Exchange (SPX) II transport protocol and an IBM data link library application program interface (API). The IBM API fosters binary compatibility between the NetSoft product and PC Support Version 2.2, meaning applications written to IBM PC Support can work with the NetSoft program, NetSoft said.

Elite/400 IWS and Elite/400 DSP Version 3.0 are priced at $295 each. The products are available now.

✆NetSoft: (800) 352-3270.

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Xyplex, Newbridge strike ATM joint development deal

BY SKIP MACASKILL

San Francisco

Xyplex, Inc. and Newbridge Networks, Inc. last week announced a joint development and marketing agreement that will bring Asynchronous Transfer Mode (ATM) capabilities to Xyplex's hub and provide Newbridge with the local-area network partner it has been seeking.

Under terms of the deal, which was announced at the INTEROP 93 Fall trade show here, Newbridge will provide Xyplex with its Vivid Ridge technology, a way to convert traditional LAN packets into ATM cells and switch those cells between LANs.

Xyplex, in turn, will give Newbridge a LAN platform for its ATM technology: the NetWork 9000 Routing Hub, which supports Ethernet, token-ring and Fiber Distributed Data Interface connectivity and local routing capabilities.

In the first phase of the joint product rollout plan, which is expected to be completed by the second quarter of 1994, the Vivid Ridge technology will be incorporated into the 9000 routing hub, providing dedicated 10M bit/sec Ethernet paths through the hub via Ethernet switching.

By the end of next year, a board-level ATM switch module will be integrated into the 9000.

That switching can be done at the rate of 170,000 packet/sec because the larger Ethernet packets will be converted into smaller ATM cells before they are switched.

By the end of next year, a board-level ATM switch module will be integrated into the 9000. The module can be used to access an ATM backbone or support desktop-to-hub ATM connectivity.

In the third phase, set for early 1995, the two companies will extend the ATM switching capabilities to the hub's backplane.

"Providing our users with a migration path to ATM that utilizes their existing 9000 was important to us," said George Conant, Xyplex's vice president of technology. "Providing ATM connectivity for the traditional LAN technologies made more sense than offering a pure ATM solution."

For Newbridge, the deal ends a search for an appropriate partner who could help the ATM vendor leverage its technology on the LAN side.

"We intend to sell the Xyplex 9000 as our target platform," said Brian NeSmith, vice president at Newbridge. "We want to focus on delivering our Vivid technology to LAN users, and the 9000 fit the bill for us because of its architecture and routing software."

Last month, Newbridge announced a partnership with another hub vendor, Optical Data Systems, Inc. (ODS), but NeSmith said the deal was simply a reseller agreement that allows ODS to market the Vivid technology.

Pricing and more complete product details will be announced by the two companies by the first quarter of next year.

✆Newbridge: (703) 834-3600; Xyplex: (508) 264-9900.

IBM looks to offer peer-to-peer product taken from LAN Server

Device would answer shortcomings of peer nets.

BY CHRISTINE BURNS

Austin, Texas

IBM is planning a move toward the peer-to-peer network operating system (NOS) market by pulling out the peer functionality currently bundled into LAN Server and selling it as a separate product.

The yet-to-be-named peer-to-peer NOS will allow personal computer users to share network resources, such as printers and files stored on hard drives, without using a dedicated server as required by LAN Server and other popular NOSes.

Art Olbert, director of IBM's Personal Software Products LAN Systems division, said the new peer offering will also include Dynamic Data Exchange (DDE) and Clipboard support.

DDE and Clipboard support lets users link Windows-based applications across a network and provide for changes made within one program to automatically appear in the other.

"We've watched the industry grapple with how to handle users' interest in peer-level computing," Olbert said.

"We think our solution wends its way through the obstacles of peer networking that vendors in the past have not been able to define," he added.

SECURITY

One complaint users have about peer-to-peer NOSes, for example, is that they lack network security since there is no central point from which a systems manager can define which users have access to what resources.

The IBM peer product will offer some security by requiring end users to manually enable their PCs to be accessed by its peers and must specify exactly which files and resources can be shared.

Olbert said IBM will make a shipping decision regarding the new peer product by year end.

PEER SUPPORT

Peer support first showed up in IBM LAN products when Version 3.0 of LAN Server starting shipping last October.

The Version 3.0 release enabled clients to access other users' files and printers without server intervention.

Sizing up LANs

Percent of market by network size.

Number of users	1991	1992	1993	1994	1995	1996
			Forecast			
1–10	42%	45%	43%	42%	41%	41%
11–34	36	32	34	34	33	32
35+	22	22	23	24	25	27

SOURCE: DATAQUEST, INC., SAN JOSE, CALIF.
GRAPHIC BY ANNE GIANCOLA

At the time, IBM officials said the peer functions would be best used by small work groups of five PC users existing as part of a LAN Server net, which can have as many as 1,000 end users.

Olbert said the new product will support

See **LAN Server**, *page 29*

Novell keeps its routing promises

BY CARYN GILLOOLY

San Jose, Calif.

Novell, Inc. is delivering on its routing promises.

Just two months after it released Version 2.1 of its NetWare MultiProtocol Router (MPR), Novell has started to beta-test enhancements that further improve the router's wide-area network capabilities. The enhancements, promised in an earlier statement of direction, include frame relay and software-based data compression.

According to several beta-site users, the enhancements are surprisingly clean and are expected to be made generally available within the next few months as software upgrades to existing NetWare MPRs.

Sources also revealed that Novell will introduce the the next generation — Version 3.0 — of NetWare MPR early next year. That release will support the company's NetWare Link Services Protocol (NLSP), which Novell claims will further enhance the product's WAN capabilities.

"We will offer a constant dribble of new features [for the MPR] after INTEROP," said Navin Jain, general manager of network management at Novell's Interoperability Systems Group based here. "We're working on frame relay, compression, filtering and DECnet support. We'll bring things out as they're ready."

DATA COMPRESSION

Novell currently offers data compression on the MPR but it is hardware-based, an add-on board from Newport Systems Solutions, Inc. The new data compression capabilities

See **Promises**, *page 32*

BRIEFS

Smart Valley, Inc. last week named Network General Corp. founder Harry Saal its president and chief executive officer effective Sept. 1. Smart Valley is a nonprofit organization based in Menlo Park, Calif., that is helping a coalition of business, government and community leaders in the Silicon Valley and San Francisco Bay areas to implement a super data highway. In addition to his new duties, Saal will continue to serve as chairman of the board of directors at Network General.

Smart Valley: (415) 473-2728.

Accton Technology Corp. has thrown its support behind the Hewlett-Packard Co.-AT&T 100Base-VG proposal for running Ethernet at 100M bit/sec. The company announced a commitment to develop 100M bit/sec Ethernet adapters and hubs, with its Centium 100Base-VG adapter debuting at INTEROP. The Centium cards are based on Accton's EtherCache architecture, which offers 64K bytes of on-board memory to accommodate either 10M or 100M bit/sec Ethernet applications. Available in January 1994, the Centium adapters have not yet been priced.

Accton: (510) 226-9800.

Fibermux Corp. has boosted its token-ring line with five new modules for its Crossbow intelligent hub. All models offer beaconing prevention. The 12-port unshielded twisted-pair modules are available now and cost $1,395. The combination modules that offer 10 copper ports and two fiber connections are available now for $1,795. A six-port fiber-optic model costs $1,895 and is available now.

Fibermux: (818) 709-6000.

Network Application Technology, Inc. (NAT) has announced upgrades to its LANB/450 Remote EtherMeter Ethernet segment

See **Briefs**, *page 27*

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DEC enters hub market with DEChub 900 multiswitch

BY JIM DUFFY

Maynard, Mass.

Digital Equipment Corp. recently unveiled its entrant in the high-end LAN hub market with the introduction of the DEChub 900 MultiSwitch.

The DEChub 900, which had been expected (*NW*, Aug. 16, page 6), is an eight-slot device with a 3G bit/sec backplane. It supports up to 18 segments of Ethernet, token-ring or Fiber Distributed Data Interface local-area networks, or any combination of the three. The speed of the hub's backplane will also enable the box to support an Asynchronous Transfer Mode (ATM) switching module, though DEC did not disclose when such a module would be available. ATM capability is a planned enhancement.

The DEChub 900 offers a software-configurable architecture. From a network management station running Version 2.0 of DEC's HUBwatch software, LAN administrators can divvy up the hub's 3G bit/sec bandwidth between the 18 segments, depending on which segments need more or less of that bandwidth. As the volume and diversity of traffic in one or more segments increases, LAN administrators can allocate more of the hub's bandwidth to those segments and vice versa.

Administrators can also reassign stations from one segment to another using the HUBwatch software.

"We're trying to provide the best integrated solution for managing change in the network," said William Mello, DEC's group marketing manager for DEChub products.

Some competitive products require administrators to physically change hardware modules to reallocate bandwidth or reassign LAN-attached devices to other segments.

HUBwatch Version 2.0 runs on a DEC VAXstation 3100 under OpenVMS and a DECwindows Motif graphical user interface. It costs $3,009 and is available 90 to 120 days after receipt of order.

The DEChub 900 chassis, which costs $3,990 and is available in the same time frame, supports several different types of modules, such as the DECrepeater 900TM. This is a 32-port, 10Base-T Ethernet module that can be used with shielded or unshielded twisted-pair wiring. It costs $2,990.

Another module is the DECconcentrator 900MX, an eight-port FDDI concentrator that supports single and multimode fiber and unshielded twisted pair. This module is priced from $3,600 to $7,500 and will be available in December.

For token-ring connectivity, DEC introduced the DECmau 900TL eight-lobe token-ring multistation access unit and DECrepeater 900TL token-ring repeaters for shielded and unshielded twisted pair. These modules allow users to attach up to eight devices to a 4M or 16M bit/sec token-ring network.

The DECmau 900TL is priced from $825 to $895, while the repeaters cost $1,205 to $1,275. They will be available three to six months after receipt of order. Like DEC's earlier modular Ethernet hub, the DEChub 900 is manageable from a Simple Network Management Protocol console. The modules can work as stand-alone MAUs, repeaters and concentrators, as well as with the DEChub 900.

BRIEFS

Continued from page 24

monitor, including new node detection, duplicate Internet Protocol address notification and the ability to filter multiple host and matrix tables by configuration. The 450 is available now and costs $2,595.

NAT: (800) 543-8887.

David Systems, Inc. has rolled out the VolksNetHub, an 18-port Ethernet hub that is priced less than $50 per port. The hub offers 16 ports of 10Base-T Ethernet via RJ-45 connectors, as well as single attachment unit interface and BNC ports. One 10Base-T port has a built-in uplink connector that allows hubs to be linked together. Available now, the VolksNetHub costs $895.

David Systems: (408) 541-6855.

Perlan has announced the PHT-12000, a 10Base-T work group hub that offers 12 ports of 10Base-T Ethernet, a single attachment unit interface (AUI) connection and a switchable AUI/10Base2 port.

Priced at $750, the hub is available now.

Perlan: (408) 292-2300.

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Fibronics' new token-ring hub bolsters line

BY SKIP MACASKILL

Pembroke, Mass.

Fibronics International, Inc. recently introduced a stackable token-ring hub, bolstered the token-ring capabilities of its chassis-based MultiHub line and rolled out an FDDI-over-copper hub.

The new FR9200 Series family of stackable token-ring hubs can support as many as 256 users in a maximum configuration.

The FR9230 Token Ring Management Unit is a 16-port controlled access unit that supports the Simple Network Management Protocol. The FR9234 Token Ring Lobe Attachment Unit is an unmanaged hub that comes in 12- and 24-port versions.

As many as 10 of the unmanaged FR9234s can be stacked and managed by one FR9230, which provides per-port status and statistics of all token-ring ports via Fibronics' InterView Network Management System or any SNMP-based net management platform. Available next month, the FR9230 and FR9234 cost $3,590 and $2,090, respectively.

The firm also announced two new token-ring modules for its chassis-based MultiHub.

The NM127 is an intelligent SNMP-based network management module that compiles management information from token rings supported by the MultiHub and relays that data to InterView, which usually runs on an IBM LAN Manager workstation or any integrated SNMP management station on the net.

The EM327 is a six-port daughterboard for MultiHub's Universal Token Ring LAN Concentrator Card and offers links to six token-ring end stations or work groups via unshielded twisted-pair wiring. The product complements the existing 12-port EM323 daughterboard.

The EM327 and NM127 are available now and cost $485 and $1,450, respectively.

Fibronics also announced the FX8700 FDDI-over-copper modular hub for connecting Fiber Distributed Data Interface nodes to a backbone network using fiber-optic or unshielded twisted-pair connections.

The FX8700 is a four-slot device with a backplane capacity of 200M bit/sec consisting of a primary and secondary FDDI ring. The device can support as many as 16 FDDI ports through any combination of FDDI or FDDI-over-copper modules.

Four-port FDDI and eight-port FDDI-over-copper modules are now available. Users can mix and match different module types, depending on their needs.

The fiber module supports 100M bit/sec connections over fiber-optic cabling at distances between 2km and 10km, while the copper version supports unshielded twisted-pair Category 5 links at distances up to 100 meters. Both modules can support single- and dual-attached end stations.

The FX8700 modules support Version 6.2 of the Station Management Protocol and include an SNMP agent that supports Management Information Base (MIB) II, the FDDI MIB and Fibronics' private FDDI MIB.

Available now, the FX8700 starts at $8,995, depending on configuration.

✆Fibronics: (617) 826-0099.

LAN Server

Continued from page 24

connectivity to LAN Server nets.

Walt Dymek, an analyst with the Delran, N.J.-based consultancy DataPro Information Server Group, said IBM's move to establish a peer-to-peer product is an effort to offer a NOS for every level.

"They want the image of having the broadest spectrum of communications and systems support available, and they're simply just hitting the two-to-five user range with this one," Dymek said.

The move also reflects an industry trend of offering PC connectivity products for smaller groups.

For example, Artisoft Inc., which last year held almost 50% of the DOS peer NOS market, recently announced plans for a scaled-down, easy-to-install version of LANtastic for customers that want to network two to five users.

GROWING LARGER

Despite the fact that large LANs are continually growing even larger, a recent research report from Dataquest, Inc. in San Jose, Calif., forecasted that by 1996, NOS sales for customers looking to connect one to 10 PCs will still account for 41% of the market (see graph, page 24).

Marty Palka, an analyst at Dataquest, said IBM's entrance into the peer NOS market will help increase the awareness of peer-to-peer connectivity among potential users.

"Having IBM break out a peer product is going to help other companies because it will help to create an awareness of what peer feature sets are out there," Palka said.

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ThinkPad 350C (486SL/25 MHz processor, 1 PCMCIA slot)

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[*Making networks work.*]

ETHERNET NETWORKS

NDC offers universal adapter card

BY CHRISTINE BURNS

San Jose, Calif.

NDC Communications, Inc. has introduced an Ethernet adapter for personal computers that can be used with network drivers from the leading Ethernet interface vendors.

The NDC ND6000-E board for PCs based on the Industry Standard Architecture bus is compatible with drivers from Standard Microsystems Corp. (SMC), 3Com Corp., Eagle Technology and Novell, Inc.

According to International Data Corp., a Framingham, Mass.-based research firm, Eagle, SMC and 3Com together accounted for more than 50% of the Ethernet adapters shipped worldwide in 1992.

"Network interface cards have reached commodity status," said Marty Palka, an analyst with the San Jose, Calif.-based consultancy Dataquest, Inc. "Having the ability to emulate the leading suppliers' products definitely gives NDC a distinction on an otherwise even playing field."

The specific drivers supported by the ND6000-E are SMC/NW's WD8003EBT and WD8013EBT, 3Com's EtherLinkII and EtherLink II/16, and Novell's NE1000 and NE2000. Since Eagle licensed the Novell technology for its NE2000plus and NE2000Tplus boards, the ND6000-E supports those, as well.

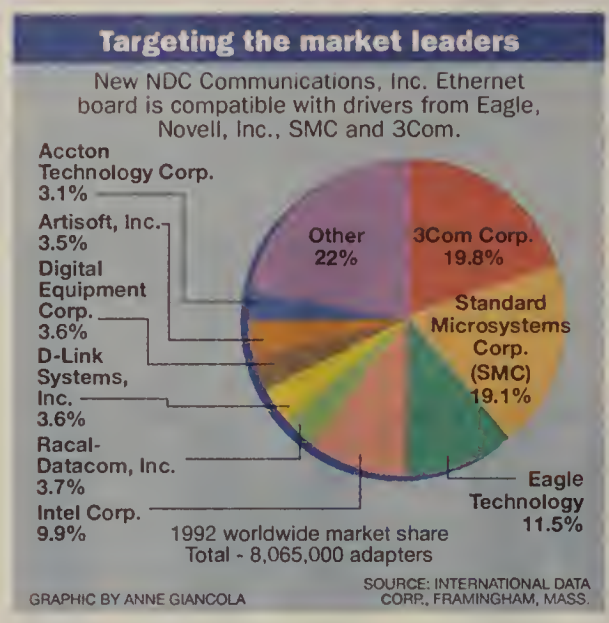
Len Palmer, vice president and general manager of NDC, said the ND6000-E adapters offer the same fuctionality as the other network interfaces but cost less. The ND6000-E, which is available immediately for $199, costs an average of $30 to $50 less than the SMC, Eagle and 3Com adapters, Palmer said.

The only software that ships with the NDC adapters is a diagnostic program that allows system administrators to specify which driver is to be used. The program enables a user to test the card to verify proper installation and locate network difficulties relating to the cards and drivers.

BETA EXPERIENCE

Bill Kelleher, associate director of computer services at the University of Utah's Eccles Institute of Human Genetics, has been beta-testing 25 ND6000-E cards in a primarily Novell NetWare environment for five months.

Since much funding for the institute comes from research grants, which mandate that certain hardware or software products be used on various projects, having a network interface card that supports three major vendors' drivers has been helpful in configuring networks, he said.



Kelleher said the Eccles Institute will standardize on the NDC card for all new purchases because of the flexibility, similar functionality and lower price tag.

The ND6000-E has on-board support for thin and thick Ethernet coaxial cable and unshielded twisted-pair wiring.

✆NDC: (408)428-9108.

Promises

Continued from page 24

will be software-based and likely included in an upgrade to Version 2.1, and built into MPR 3.0, expected early next year.

One user testing the software-based compression said it supports higher speeds than the hardware-based product.

"Until now, we'd been using the Newport board [at ordinary line speeds]," said the user, who requested anonymity.

"The new software compression works up to T-1 speeds, and that's something we've been waiting for," the user added.

"Frame relay gives us the ability to truly get an effective WAN to link our LANs," Bandrowski said. "It allows us to have bursty traffic at a low cost."

OPTIONS

According to Eric Ness, senior systems analyst at Kandl Data Products, a Novell reseller based in Beltsville, Md., "If you're paying $1,000 a month for wide-area bandwidth and your users start calling saying they need more bandwidth, you're going to want to look at data compression before you think about spending another $1,000 a month on another wide-area link."

Ness pointed out, however, that data compression is most effective for sending text files, such as database files, across the link as opposed to executable files.

"Data compression can routinely get you up to 4-to-1 compression if you're sending data files," he said. "But you'd be lucky to get about 2-to-1 compression if you're sending executables."

The frame relay support is also expected to first show up as a software add-on for MPR 2.1 and then be built into 3.0, users say. And frame relay has even more cost-saving potential than data compression.

"Frame relay gives us the ability to truly get an effective WAN to link our LANs," said Paul Bandrowski, technology manager at Sara Lee Corp., a large NetWare user based in Chicago. "It allows us to have bursty traffic at a low cost."

COST SAVINGS

Bandrowski estimated his company could see as much as a 500% cost savings using frame relay technology.

He gave an example of a company paying between $12,000 and $20,000 a month for a dedicated T-1 link from New York to California. Frame relay, he said, would let the customer only use the bandwidth when it was needed.

"Your cost then goes down to something like $2,000 to $3,000 a month," he said. "There's potential for extreme cost savings."

Users testing the frame relay beta version had not yet completed their testing and declined to provide details on potential cost savings or performance figures.

However, all agreed that the beta versions being tested now are virtually shippable.

"I suspect the beta will be a short one because what I've seen so far has been really good stuff," said a user at one beta site.

3Com expands FDDI across product line

With new modules for LinkBuilder 3GH.

BY SKIP MACASKILL

San Francisco

While grabbing headlines of late with its 100M bit/sec Ethernet products, 3Com Corp. has not forgotten about the original 100M bit/sec technology — Fiber Distributed Data Interface.

At the INTEROP 93 Fall trade show here last week, the company rolled out additions to its FDDI-over-copper line as well as reduced pricing on a hub-router package for users wanting to build distributed backbone nets based on FDDI.

According to Edgar Masri, director of hub product marketing at 3Com Corp., 20% to 30% of the company's users employ distributed backbone architectures in their networks, while collapsed backbones take home the largest piece of the pie.

3Com added FDDI-over-unshielded twisted-pair wiring products to its intelligent hub, work group hub and network interface card (NIC) lines.

The new 12-port module for the LinkBuilder 3GH hub supports FDDI devices over unshielded twisted-pair Category 5 wiring. Available in the fourth quarter, the module, which meets the ANSI draft standard for running FDDI-over-copper links, costs $9,950.

A six-port FDDI-over-copper module for the LinkBuilder FDDI work group hub will also be available in the fourth quarter. It will cost $3,295.

The FDDILink-UTP NIC rounded out the FDDI offerings.

The adapter, which works in Extended Industry Standard Architecture-based machines, will cost $995 and be available in the fourth quarter.

To address users' needs for FDDI connectivity in distributed backbones, 3Com will offer its NetBuilder II router and LinkBuilder Multi Services Hub (MSH) in a bundled package. That move is also a competitive thrust against hub rivals that offer integrated routing in their devices.

"Since the integration is normally the result of an OEM deal, a lower end device, or wimpy router, is usually provided."

In distributed backbones, internetworking devices such as routers are placed on each floor of a building to route traffic among local-area networks on that floor.

For users that want to install FDDI backbones to tie everything together, 3Com has combined its MSH and NetBuilder II into a specially priced bundle.

The bundle is available in two configurations and represents a savings of $3,000 off the price of purchasing the hub and router separately.

A LinkBuilder MSH outfitted with a management module can be packaged with either a four- or eight-slot NetBuilder II that comes with a Communications Engine Controller module, which handles the routing functions, and an FDDI module.

The four-slot package costs $19,190, while the eight-slot version costs $21,690.

3Com, which does not offer routing modules for any of its chassis-based hubs, contends that routing and hubbing are two functions best kept apart, according to Edgar Masri, the company's director of hub product marketing.

"If you integrate the router into the hub, the router's performance is reduced by about 20% on average because the hub's backplane is usually not robust enough to handle the router's performance requirements," he said.

"Since the integration is normally the result of an OEM deal, a lower end device, or wimpy router, is usually provided," Masri added.

3Com based that performance degradation on a comparison of Cisco Systems, Inc.-stated performance figures for the stand-alone and integrated versions of Cisco 4000 router, one of the more popular integrated routers.

In conjunction with the bundling announcement, 3Com rolled out a four-port local Ethernet bridge module and a two-port token-ring bridge module for the LinkBuilder MSH.

The modules, which will support source route and source route transparent bridging, will be available in the first quarter of 1994. Pricing will be announced by year end.

✆3Com: (408) 764-5000.

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- Survey the key elements of Abstract Syntax Notation One (ASN.1), the language used to define SNMP message formats.
- Understand how TCP/IP and the related Internet protocols such as UDP and IP support SNMP.
- Learn how test equipment that supports the Remote Monitoring (RMON) MIB can assist with distributed LAN management.
- Understand the enhancements found in SNMPv2, such as Manager-to-Manager communications, the GetBulk Protocol Data Unit, and enhanced Security.
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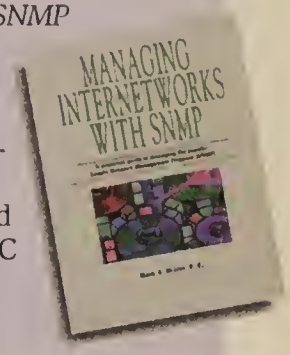

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"Once we saw the power of Sync, we told the reps from [redacted] and [redacted] to get lost."

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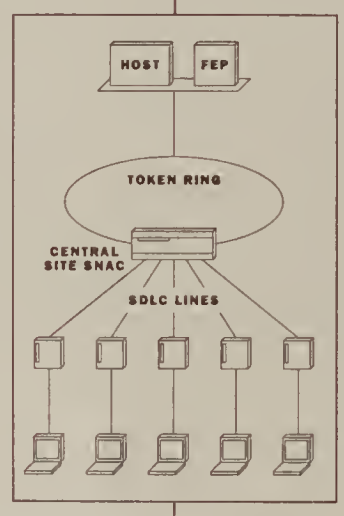

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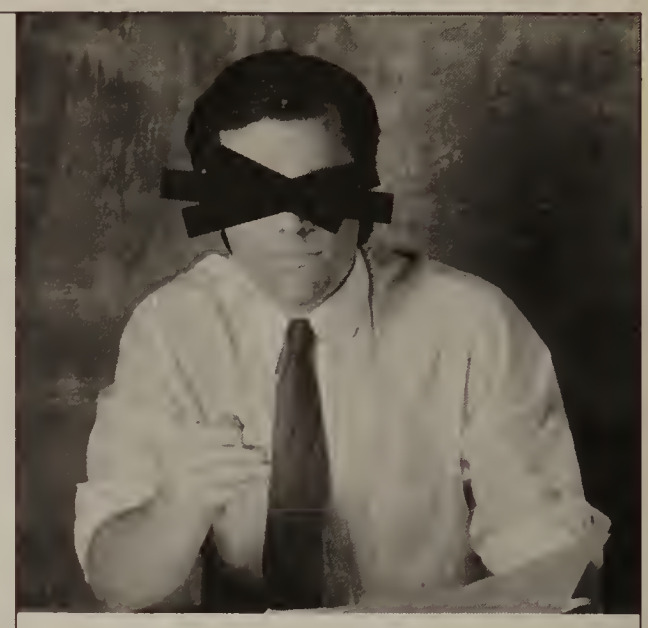

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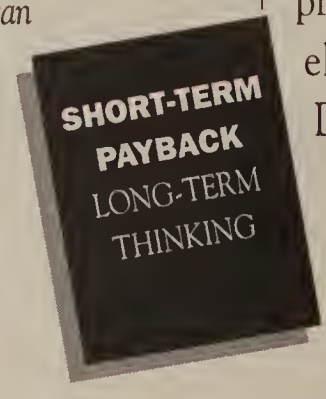

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Canada to build nat'l backbone network

BY ELLEN MESSMER

Toronto

The Canadian government this month set aside $26 million to build the first phase of a national backbone network, the Canadian Network for the Advancement of Research, Industry and Education (CANARIE).

Canada views the network as vital to the country's future and anticipates that industry will contribute an additional $87 million in funds and equipment during the first two years of the effort.

"I believe that CANARIE is a major step forward in building a national R&D net that will be as important to Canada's future as the Canadian Pacific Railway was in the last century," said Rob Nicholson, Canada's minister of science.

CANARIE is envisioned as a high-speed network that will link national databases, support electronic mail and access to "virtual libraries," and handle large volumes of data, text, images, video and audio simultaneously. Medical centers, for example, could share X rays over the network.

Although there is also much interest in the Clinton administration in developing an information superhighway, Canadians say their approach differs in its reliance on the private sector, rather than the government, as in the U.S.

Although Canada has long funded

See Canada, *page 40*

The Canadian Network for the Advancement of Research, Industry and Education (CANARIE)

The Canadian government will spend $26 million between 1993 and 1995 to build CANARIE, which will be administered by the private, nonprofit firm CANARIE, Inc. The funds include:

- **$5 million to upgrade the current CA*Net research net from 56K bit/sec to the T-1 CANARIE net.**
- **$3 million to add application services, including X.500 directories.**
- **$16 million to develop new products and services, such as medical imaging, with emphasis on OSI-based implementations.**
- **$2 million for experimental research, for example, gigabit networks.**

The government anticipates industry putting up $87 million in matching funds and donated equipment through 1995. Canada plans to spend an additional $100 million on CANARIE between 1995 and 1998, but those funds are not yet allocated.

GRAPHIC BY TERRI MITCHELL SOURCE: CANARIE, OTTAWA

BellSouth to install 30 ATM switches

Net upgrade awaits strong business demand.

BY BILL BURCH

Atlanta

Among the regional Bell holding companies, BellSouth Corp. is one of the most aggressive in modernizing its network for new services. The carrier plans to deploy as many as 30 Asynchronous Transfer Mode (ATM) switches in its nine-state region over the next three years.

REDDERSEN

Driving that deployment is a business plan that anticipates substantial increases in demand for broadband services, particularly multimedia applications.

The BellSouth executive in charge of planning the carrier's broadband network upgrade, Bill Reddersen, vice president of broadband strategies, has embraced the multimedia gospel.

Reddersen, 44, started off his career with 18 years at AT&T. The past six years he's been with BellSouth — three as a vice president of marketing with BellSouth Enterprises, Inc. and then three in business marketing with BellSouth Communications, Inc.

He is fortunate enough to be launching the network upgrade from a position of strength; the carrier has one of the most modern of the local exchange carrier networks. At the end of last year, 61% of the company's access lines were served by digital switches and it had installed close to a million miles of fiber.

The carrier is joining the fiber through self-healing rings; plans call for installation of rings in BellSouth's top 20 cities by next year.

The next step is to equip its fiber facilities to support the switched optical network standard, then install ATM switching, Reddersen said.

See BellSouth, *page 40*

ATM PIONEERS

Motorola takes a long hard look at the promise of ATM technology

BY BILL BURCH

Washington, D.C.

The recent introduction of Asynchronous Transfer Mode (ATM) services by Sprint Corp., WilTel and MFS Datanet, Inc. makes ATM seem closer than ever.

But before end users start singing the hosannas of simultaneous voice, video and data, network managers have to figure out how to capitalize on the new technology.

At Motorola, Inc., network managers foresee problems in the transition to ATM, including high carrier costs, unstable standards and expensive equipment.

A leader in chip design, wireless communications and other high-tech areas, Motorola depends on its voice and data networks to link huge sites scattered around the country.

Phoenix is the company's largest site with 30,000 users; Chicago is second at 20,000. Austin, Texas, and central Florida round out the list of Motorola's largest sites.

To handle computer-aided design and manufacturing traffic and other data traffic, Motorola currently leases six to 12 T-1 lines between each pair of sites. That high volume of traffic has the company experimenting with ATM, according to Sean Parham, a Motorola research engineer.

By pooling that data traffic with voice traffic currently supported by a virtual network, the company could realize economies of scale. But to reach that sort of volume — and smooth out data traffic demands on the network — Motorola would have to put most of its sites on the network, not just the few largest, Parham said.

Such a network would be horrendously expensive, requiring a series of transcontinental T-3 lines. It would also be far beyond Motorola's current needs, Parham said.

The alternative is to use a public ATM service. But even on a public network, costs remain high. To connect one site at the T-3 speed of 45M bit/sec would cost $5,000 per month per site, Parham estimated.

Equip each site with a second port for backup routing and the per-site cost doubles to $10,000. As a result, Motorola's evaluation of carrier-based services focuses on costs, and figuring out per-workstation expense is one of the goals of the company's ATM pilot programs.

To help cut those costs, Parham has two requests for carriers. First, ATM access at 1.5M bit/sec would allow a cheaper link between a site and a carrier's point of presence.

Second, a low monthly access fee accompanied by a per-unit transmission charge would help keep costs down while providing carriers with a reliable minimum service revenue.

CAMPUS CONCERNS

The concerns with ATM in a campus environment are different. On a campus, bandwidth is almost free once fiber is strung. The pitfall in equipping a campus network is buying expensive equipment that could quickly become obsolete, Parham said.

One of Motorola's business units recently approached Parham with a proposal for a new campus network. The group's engineers were installing a series of powerful workstations and wanted to use ATM to interconnect their machines.

Their enthusiasm cooled when Parham told them the current price for ATM network interface cards (NIC). Regardless of price, Parham said he believes the cards are not stable yet and will change as ATM evolves.

"If we have 1,000 workstations that we want to set up on an ATM network, do we go out and buy 1,000 [NICs] that we will potentially have to replace in the next year?" Parham asked. "That's a lot of cost to flush within a year."

One alternative would be for vendors to offer to swap out the ATM NICs in a year's time at no charge, but Parham said he doubts any manufacturer will volunteer such a deal.

Instead, Parham is considering using ATM to support Ethernet switching. Then, as products such as interface cards mature, he will upgrade the workstations with the highest bandwidth requirements to ATM.

"That's a transitional strategy from Ethernet to switched Ethernet to ATM," according to Parham. "That's important to us, but difficult to buy today."

For his network, Parham is searching for a hub vendor that sells both Ethernet and ATM, and offers a path from one to the other.

BRIEFS

Southern Oklahoma State University is building an interactive distance-learning net to link classrooms at its main campus in Weatherford with its branch campus in Sayre. The net, being contructed by **AT&T** and **Dobson Communications Corp.**, will include 80 miles of fiber-optic cable and a T-3 interactive videoconferencing system.

The State of Arizona has awarded **MCI Communications Corp.** a three-year, $15 million contract to provide toll-free access service for the deaf to the Arizona Relay Service. MCI, working under contract with the Arizona Valley Center for the Deaf, will provide services that convert text input into voice messages and vice versa.

AT&T has announced that its European AT&T Istel unit received a five-year, $50 million contract to build and manage a pan-European data net for Worldspan. The deal is a step toward creating a global data net for Worldspan's worldwide operations. The unit signed a separate $100 million contract with AT&T to migrate its U.S.-based travel agency customers to a nationwide net. Worldspan is owned by affiliates of Delta Air Lines, Inc., Northwest Airlines, Inc., Trans World Airlines, Inc. and Abacus Distribution Systems Pte. Ltd.

Is time running o

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NOVELL. The Past, Present, and Future of Network Computing.

BellSouth

Continued from page 37

Although BellSouth is eager to switch its fiber network to Synchronous Optical Network (SONET) and ATM, Reddersen is having trouble finding qualified personnel for the project. "The people who know how to traffic engineer a SONET/ATM network are reasonably scarce," he said.

For ATM, BellSouth plans to install switches as demand warrants. But in North Carolina, the carrier has committed to a leap of faith for ATM, with a little help from the state government as an anchor tenant.

BellSouth's ATM plans for the state announced in May call for installing backbone switches in Asheville, Charlotte, Greensboro, Raleigh and Wilmington.

The first of the switches will come from Fujitsu Switching of North America. The network will start off just carrying data, but will soon include video and eventually handle voice.

As the network's principal user, North Carolina's state government plans to use it to support education, medical research and diagnosis, and government and criminal-process administration. BellSouth is hoping it can extend the North Carolina model to Georgia and will be providing ATM to a couple of hundred Georgia locations soon, Reddersen said.

Reddersen said he believes three forces are pushing telecommunications managers toward multimedia networks that will demand ATM.

First is the trend toward network integration. Businesses historically have had multiple nets for voice, data and videoconferencing, but technologies such as ATM will allow them to combine applications on a single network.

Second, companies need to capture data and make it available within their organizations. For example, airlines started out supporting travel agents with operators and automatic call distributors, but switched over to on-line reservation systems.

Third, businesses will be able to make better use of critical resources. For example, teachers can reach a broader audience through distance learning.

Canada

Continued from page 37

programs for networking and applications development, the Canadian government decided to turn the $26 million in funds for CANARIE over to a nonprofit company, CANARIE, Inc., which will decide how the money is to be spent.

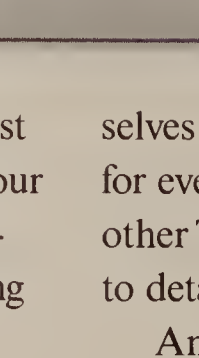
"The government is outsourcing the funding in this area," said CANARIE, Inc. Chairman of the Board Bill Hutchison, also national director of technology for Ernst & Young, a consultancy in Toronto. "[The government is] persuaded that the private sector can make the decisions better."

CANARIE, Inc. has 55 members, 30 of which are corporate — including Hewlett-Packard Co., Digital Equipment Corp., NCR Corp. and IBM — while the balance are universities and research institutions.

The effort is "about industrial and economic development in Canada," Hutchison said. The government could pour as much as $100 million more into the network after 1995, although those funds have not yet been allocated, he said.

During the first two years, a portion of the government funds (see chart, page 37) will be used to upgrade the 10 nodes on Canada's current research network, CA*Net, from 56K bit/sec to T-1 speeds.

The lion's share of the two-year funding, $16 million, is expected to be allocated to develop software used in imaging, distributed manufacturing and library applications. "In September, we're publishing the guidelines for this," Hutchison said.



NICHOLSON

As CA*Net is upgraded to officially become CANARIE, there will be continuing support in the network for Transmission Control Protocol/Internet protocol, Hutchison said. But the upgrade will expand support to include Open Systems Interconnection since the Canadian government — like the U.S. — officially endorses OSI in federal procurements.

Bellcore bows out as czar of telco numbers

BY BILL BURCH

Washington, D.C.

Tired of catching flak for its assignment of phone numbers, Bell Communications Research recently told the Federal Communications Commission to find somebody else to administer the North American Numbering Plan.

Bellcore wants to turn over plan administration in the next 12 to 18 months, but the research consortium likely will continue to administer the plan until a new numbering plan takes effect in January 1995.

As plan administrator since Jan. 1, 1984, Bellcore has been responsible for assigning area codes and service access codes for the United States, Canada and various Caribbean nations. But over the last half year, companies have questioned the propriety of a privately funded organization administering a public resource. Bellcore is funded by the seven regional Bell holding companies and other carriers.

Among Bellcore critics was Telocator, a trade association of wireless companies. Telocator President Thomas Stroup said the plan should be administered by a disinterested party. He then volunteered his group for the task.

In announcing its resignation to the FCC, the research consortium defended its work as plan administrator. "Bellcore has been a responsible and impartial caretaker of the numbering resources it has administered, and has promoted the public interest by seeking to maximize efficiency and minimize costs,"

the organization told FCC Chairman James Quello in a letter.

In choosing a successor, the consortium suggested that administration of the plan be subject to government oversight, but not become bogged down in revision and review. If a new administrator is not chosen within 18 months, Bellcore said it is willing to continue until a successor is chosen.

Peyton Wynns, chief of the FCC's industry analysis division, said the commission has not decided on a new plan administrator. An FCC notice of inquiry on the plan late last year drew a number of suggestions regarding who should administer it, including the commission itself, the Commerce Department's National Telecommunications and Information Administration or a private contractor.

As a shared research group owned by carriers, Bellcore has struggled to avoid the appearance of a conflict of interest in parceling out finite numbering resources. The organization recently told the FCC it would begin assigning exchanges in August for personal communications services (PCS) unless the commission told it otherwise. But the FCC rebuked Bellcore, telling it not to proceed with those assignments and then issued a notice of inquiry on PCS numbering.

In January 1995, the new numbering plan will introduce area codes with second digits running from 0 through 9; for current area codes, second digits can only be a 0 or 1. The new numbering scheme will greatly increase the number of available area codes, numbers currently in short supply.

"The numbering plan is going through the most significant changes that it's had since its inception back in the 1940s," said Bellcore's Ron Conners, the current North American Numbering Plan administrator. "The one thing we can't afford to do is just let it drop on the floor."

MFS expands bypass nets in Silicon Valley

BY BOB WALLACE

Oakbrook Terrace, Ill.

MFS Communications Co. has announced plans to expand its network in Dallas and build an all-fiber bypass network linking its San Francisco network with communities along the San Francisco peninsula south to Silicon Valley and San Jose.

In addition to using MFS' local private-line and special access services to support voice and data communications, users served by the company's nets will be able to use local-area network interconnection services offered over a nationwide Asynchronous Transfer Mode (ATM)-based network its MFS DataNet unit turned up last month.

The new 151-route mile San Jose-Silicon Valley network will connect 81 buildings.

Construction of the network will start during the fourth quarter of 1993 and is scheduled for completion in the first quarter of 1994.

In addition to San Jose and other Silicon Valley communities such as Cupertino and Menlo Park, the network will serve users in Burlingame, Foster City, Mountain View, Palo Alto, San Bruno, San Carlos, San Mateo, Santa Clara and Sunnyvale.

The San Jose-Silicon Valley network will be connected to 11 Pacific Bell central offices, allowing users linked to Pacific Beli's network to access MFS services.

The Federal Communications Commission has released orders that allow competitive access providers to interconnect with Bell operating company networks to provide special access and interstate switched transport portions of local exchange services.

In Dallas, MFS will extend its 30-route mile, 41-building network to serve 47 more buildings in the northern part of the city and suburban areas to the north and northwest including Addison, Carrollton, Farmers Branch, Plano and Richardson.

Construction will start in September, and the network will be operational in December.

Helping users find vanity 800 numbers

BY BOB WALLACE

Cherry Hill, N.J.

A.C.S. Software Division, a software development firm based here, recently announced general availability of a program that helps network managers find vanity 800 numbers that can be easily recognized and remembered by customers.

Dave Ronson, a software developer with A.C.S. Software, created the innovative program called 1-800-DIAL-WORD, which runs on a personal computer with 512K bytes of random-access memory.

With 1-800-DIAL-WORD, a network manager can enter the company's existing 800 number and the software will generate a listing of all possible words and letter/number combinations. A.C.S. found that its sales support number, 1-800-342-5967, spelled 1-800-DIAL-WORD, for example.

The list also generates possiblities based on so-called "overhang" numbers, which include an extra digit tacked onto the end of the toll-free number sequence. This is possible because telephone networks do not recognize numbers keyed in after the seven-digit number.

Ronson said his program is being used by some long-distance providers that find particularly attractive 800 vanity numbers and try to pitch them to the appropriate companies. "It's a great product for carriers to use when prospecting for new customers."

A.C.S. charges users a onetime $29 single-user software license fee or a onetime $500 fee for a 50-copy package, which includes only one manual and set of documentation.

©A.C.S.: (800) 342-5967.

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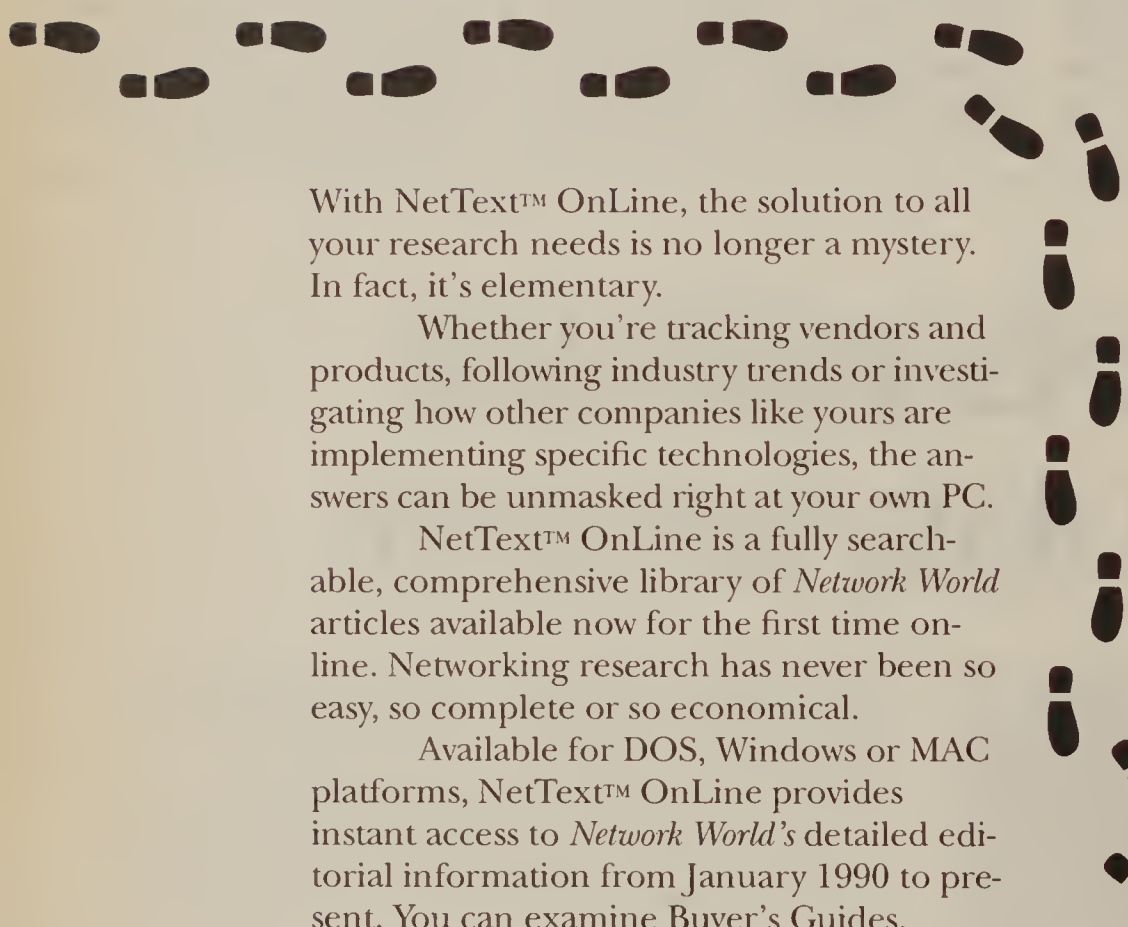

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NET INSIGHTS

by Eric Schmall

Passive-aggressive mgmt.

When conjuring up an image of the typical bad boss, many people think of the stereotypical image of an overbearing incompetent with an insufferable ego — the kind of person that leaves wrecked careers and crushed hopes in his or her wake. And while there are some Genghis Khans out there, you have much more to fear from the unheralded passive-aggressive manager.

Instead of a fire-breathing ogre, nightmare managers are more likely to be mild-mannered and have an affable social demeanor that leads you to think they are the soul of reason.

Don't be fooled. Since it's generally considered bad form nowadays to treat subordinates as galley slaves, some executives have adapted more covert means of controlling, punishing or manipulating their staff.

It can be tough to spot these bad bosses since they quote from the lexicon of more enlightened management.

They will faithfully mouth phrases like "empowering employees" and openly talk of seeking consensus, building trust, being forthright and honest.

Unfortunately, they're just parroting what's politically correct for the modern workplace.

A manager's actions are the best clue to whether he or she has these passive-aggressive tendencies. The primary warning signal comes with managers who consistently betray their people by withholding information. He or she attends meetings with users and doesn't let subordinates know about commitments that have been made.

He or she conceals critical plan information from the staff until the last minute, panicking the staff with new schedules, projects or changes.

This degrades the quality of their work and then they have to listen to the manager's admonishments about improving quality performance.

Passive-aggressive managers set up strict — but often unstated —boundaries over what the staff can research, who they are allowed to talk to or what competencies they will be allowed to develop. They like keeping everyone in their preassigned boxes.

For instance, such managers would take a dim view of a technical person becoming competent in financial analysis.

This kind of manager doesn't want people to fail so much as he or she wants to throttle their success. If they perform too well, such a manager regards them as potential usurpers of his or her job.

The passive-aggressive chief accomplishes his or her goal by keeping people in a continual state of imbalance, frustration and anxiety. He or she confines them, unleashes surprise information to confound them and commits them to goals with no consultation.

This way, no one can ever exceed or even meet the manager's expectations because of the roadblocks put in their path.

Through subtle manipulation of information and rules, these managers can create and maintain this psychologically crippling environment.

Survival under this kind of management is possible, but not easy. Don't count on reforming the passive-aggressive manager. He or she is probably unaware of the motivations that drive them anyway.

Besides, an individual like this is not about to take the advice of subordinates seriously. To admit to a weakness is to admit inferiority.

Instead, learn the favorite behaviors this individual likes to use to keep you off-balance. If he or she doesn't share information readily, keep informed through your own network.

Plant ideas in his or her mind and let it appear that they were the one originating them. Continue to grow your competencies in diverse areas but don't flaunt your knowledge and skills too openly.

The only way to "win" in these circumstances is to adapt guerrilla tactics until this character gets reassigned somewhere else.

Perhaps the best way around this is to follow the octogenarian's advice on how he had come this far with so many friends. "Simple," he said, "I outlasted my enemies."

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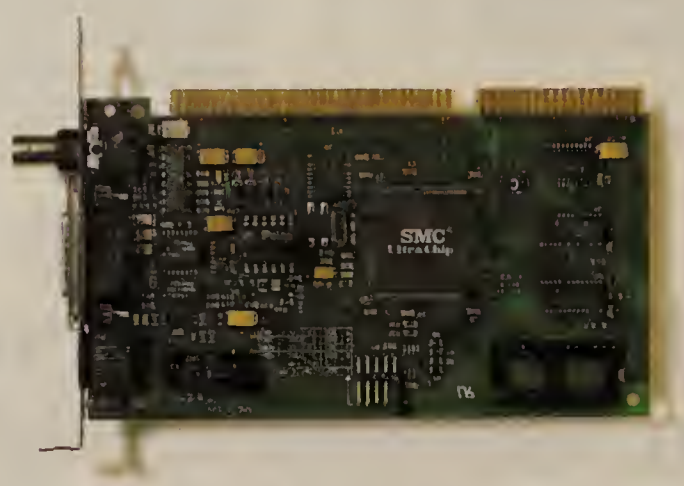

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BRIEFS

OSIware, a business unit of Infonet Services Corp. based in Burnaby, British Columbia, announced a new version of its facsimile gateway software for X.400 nets. The Messenger 400 Fax Access Unit (FAU) allows users to send faxes to a fax gateway in a remote location where they will be delivered to the receiving fax machine. This enables a company to reduce long-distance charges and the need for individual fax modems and fax machines.

FAU software requires a dedicated Intel Corp. architecture personal computer running OS/2 and can support as many as seven GammaLink, Inc. GammaFax CP fax boards. The software will be available within 30 days and will cost up to $10,000 for a version supporting seven fax boards.

Upgrades for current FAU users (which can support up to four fax boards at a lower performance rate) can upgrade to the new version for $35.

OSIware also announced a new version of Messenger 400, which is X.400 software for Unix, that supports a 1988 X.400 messaging standard user agent. The new version is available immediately for Sun Microsystems Computer Corp. SPARC systems, with support for IBM RISC System/6000 due in 90 days and later releases to follow. Pricing starts at $4,000.

OSIware: (604) 436-2922.

Objectivity, Inc. of Menlo Park, Calif., announced it will license SQL technology from Dharma Systems, Inc. Objectivity will combine Dharma's SQL engine, which was developed in C++ under Unix, with Microsoft Corp.'s Open Database Connectivity specification to enhance access to the Objectivity/DB object-oriented database management system. This will allow application developers to use high-level SQL-based development tools instead of C++ code to access both object and relational databases.

Objectivity: (415) 688-8000.

Lucas Management Systems, based in Fairfax, Va., announced a Windows NT version of its Artemis Prestige for Windows project management software that will use Microsoft's SQL Server as the central repository for project information.

Artemis Prestige offers multiuser access to project management information at the enterprise level.

Lucas Management Systems: (703) 222-1111.

Wall Data, Inc. of Palo Alto, Calif., announced that it will acquire Capella Systems, a developer of Windows-based electronic mail client software. Wall Data will continue to develop, market and support Capella's SmartScreen software, and Capella's staff will join Wall Data as an operating unit.

The company also announced it has made an equity investment in and formed a strategic partnership with Isocor, a Los Angeles-based developer of messaging transport systems. Wall Data will incorporate Isocor's X.400 technology into its Rumba software.

Wall Data: (415) 858-0481.

African ports group takes Notes to improve economy

Groupware to be used for office automation.

BY CARA CUNNINGHAM

An African seaport association is evaluating a suite of Lotus Development Corp. Notes-based applications aimed at providing the automation and communications needed to turn its cities into world-class ports and bring prosperity to the continent.

The Ports Management Association of Western Central Africa (PMAWCA) is reviewing model applications designed to provide both office automation and port-management for its 17 member countries. The PMAWCA hopes the proposed $2 million system, based on Lotus' Notes, will significantly boost the efficiency of the African ports, which in turn will stimulate the economies of all the countries involved.

"We depend on ports for 90% of the cargo going in and out of the countries," said Pap Njanko N'Jie, secretary general of the PMAWCA. "Ports are part and parcel of our economy; without them, it's going to be very weak."

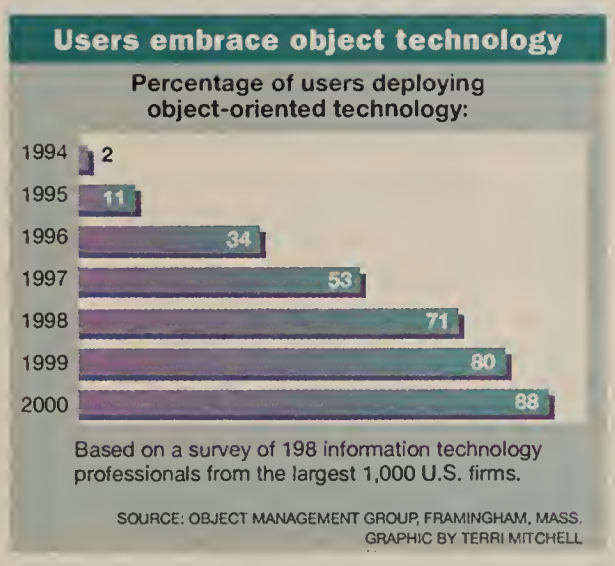
Although many of the ports in the association use computers to some extent, none have integrated their port-management applications with office-automation systems, he said. Much of the current port-management information is stored in mainframe applications and is not easily accessible to all the users who need it. In addition, there are few communication links among the ports and little information is shared among them.

The proposed system to integrate management information and link the ports should heighten efficiency, cut down on human error and help the ports attract more traffic, N'Jie said.

"Shipowners are up on the latest technology, and more will want to come to our ports if they know that we are computerized," he added.

The association recently selected Synetics, Inc., a Wakefield, Mass., system integrator, to prototype the applications, which it will demonstrate at PMAWCA's annual meeting in October. The association chose Synetics' proposal over a competing one from Digital Equipment Corp. because it

See Africa, *page 46*



Users making plans for object technology apps

BY WAYNE ECKERSON

Framingham, Mass.

While few users understand the complexities of object technology, most are optimistic about its value and have at least tentative plans to deploy object-oriented tools to build distributed applications in the near future.

In fact, by 1997 more than half of information technology professionals at large firms said their companies will deploy object-oriented technology, according to a recent survey sponsored by the Object Management Group (OMG) (see graphic, this page). "It's safe to say that most large companies are experimenting with object technology today as a first step toward deploying object-oriented applications in the

See Object, *page 46*

Aspect rolls out apps to unlock ACD data

BY BOB BROWN

Atlanta

Aspect Telecommunications this week will announce new Windows desktop applications and connectivity software designed to give personal computer users access to real-time and historical data collected by Aspect's automatic call distributor (ACD) system.

Aspect's Windows-based CustomView applications are designed to unlock information that previously has been confined to the telecommunications closet and make it available to any employee within an organization who needs it.

Data gathered by ACDs can be used for a variety of applications, such as enabling a marketing department to track where customers are calling from and what products they are calling about in real time.

Aspect's CallCenter System ACDs are used to handle high volumes of calls, typically for corporate sales and customer service organizations. Aspect is making its product announcement at the Incoming Call Management Conference here.

"Call centers are handling hundreds of thousands of calls a day, which means a tremendous amount of information about business operations is going through ACDs," said Robert Blatt, director of software at Aspect, which is based in San Jose, Calif. "Until now, the telecommunications manager has been the gatekeeper for this information. We've come up with something to integrate call centers into the enterprise network so that others can access this information more easily."

Aspect's new application offerings are CustomView Producer and CustomView Director. The company has also renamed its original CustomView product as CustomView Editor.

The CustomView applications, residing on the client system, access information from the ACD, acting as the server, by making SQL requests. Real-time data is stored in shared memory on the ACD system, while historical records of calls handled by the ACD system are kept in an integrated Informix Software, Inc. database.

CustomView Producer enables users to build customized views of call events in progress. An application could be designed with CustomView Producer for or by a marketing manager overseeing a new advertising campaign, enabling the manager to track customer calls by the ad source, such as radio, print or television.

CustomView Director simply enables managers, supervisors and other executives to use the views created with CustomView Producer. CustomView Director will also come bundled with some basic views.

See Aspect, *page 46*

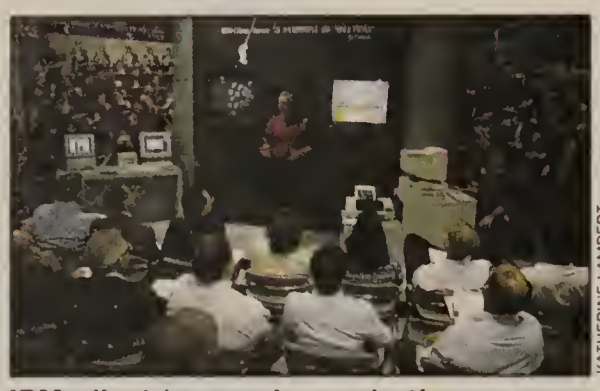
Client/server heats up D.C. conference

BY WAYNE ECKERSON

Washington, D.C.

The dog days of summer didn't slow the client/server bandwagon as several vendors last week demonstrated or announced new products at the Client/Server East Conference and Exposition here.

Attendees could view exhibits from more than 60 vendors and hear presentations from industry experts on a variety of topics, including mobile computing, administering and securing client/server nets and object-oriented methods.



KATHERINE LAMBERT

IBM client/server demonstration

IBM at the show introduced a multivendor client/server demo that will be the basis of a 12-city road show that will hit the streets in mid-September.

Put together by IBM's Client/Server Computing Group, the demonstration purports to show IBM's commitment to client/server computing and the range of tools, platforms, services and applications IBM can integrate within a distributed environment, according to Peter Tarrant, IBM's client/server marketing director in White Plains, N.Y.

The demonstration is the first big splash made by IBM's Client/Server Computing Group, which was formed last year to coordinate the development of client/server solutions across all of IBM's lines of business.

The demonstration, which simulates the operations of a small business, pulls together tools and services offered by IBM business units as well as numerous IBM Business Partners, such as PeopleSoft, Inc. and SAP America, Inc., Tarrant said. It gives examples of how IBM can provide multivendor client/server solutions in the areas of work group computing, application development, transaction processing, distributed databases, network and systems

See **Client/server**, *page 47*

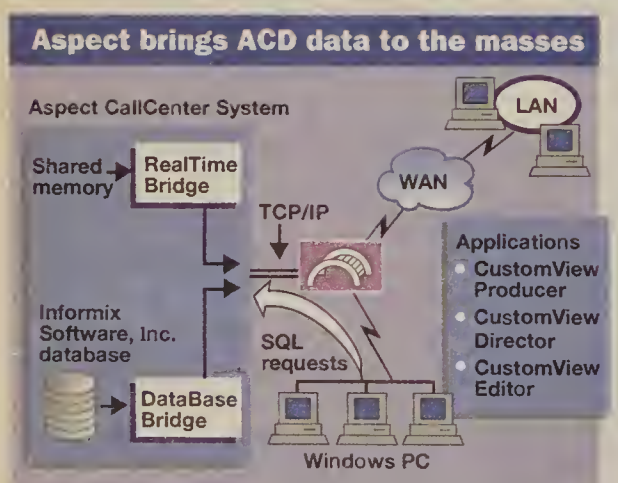
Aspect

Continued from page 45

CustomView Editor enables PC users to create reports based on historical call record data.

Aspect will provide two new underlying connectivity software packages that enable the CustomView applications to access data on the ACD: the RealTime Bridge and the DataBase Bridge. Both software offerings reside on Aspect's Unix-based ACD and provide Ethernet connectivity to Windows clients via the Transmission Control Protocol/Internet Protocol.

Aspect brings ACD data to the masses



Developers and end users can access data from the Aspect CallCenter System automatic call distributor (ACD) using Aspect's new CustomView applications. RealTime Bridge and DataBase Bridge software provide real-time and historical data, respectively, to CustomView users.

GRAPHIC BY ANNE GIANCOLA

SOURCE: ASPECT TELECOMMUNICATIONS, SAN JOSE, CALIF.

The RealTime Bridge supplies end users with the current status of calls in progress, agents, trunks and other call center resources. It provides users with access to data collected in the ACD system's shared memory.

The DataBase Bridge provides end users with historical data based on calls handled by the ACD and stored in the ACD's Informix database, which can hold up to 1.5 million call history records. It was offered as a component of Aspect's existing CustomView application for about 18 months but is now being unbundled.

"There is so much information in this telecommunications equipment people have yet to exploit," said Al Lill, a vice president at Gartner Group, Inc., a market research firm in Stamford, Conn. Users and vendors "are waking up to this fact," he said.

Both the DataBase Bridge and the RealTime Bridge will be available in the fourth quarter, and each will cost $2,000 per CustomView user attached to the ACD.

CustomView Producer and CustomView Director will be available in the fourth quarter. CustomView Producer will cost $14,995 per user with multiuser licenses available. CustomView Director will cost $595 per user.

✆Aspect: (408) 441-2200.

Africa

Continued from page 45

will allow them to leverage their existing hardware, instead of requiring them to buy new computers from DEC.

Synetics will recommend that each port use Notes to facilitate basic sharing of information and communication, said Shad Uttam, a Synetics system analyst. By using Notes, for example, one port would be able to enter information into its port-management application about a particular vessel — its dimensions, the name of its captain and its point of origin — and replicate the information to the other systems, eliminating the need to repeatedly enter the same statistics at each port of call.

N'JIE

The ports would also be able to set up "discussion" databases within Notes, in which users could enter and share information about developments in shipping container technology, Uttam said.

Port authorities will be able to pick and choose from six application modules, including vessel and equipment tracking, cargo statistics and more, Uttam said. The company plans to customize this system for each port authority by adding drivers for accessing its mainframe data and integrating each port's choice of office applications, like word processors.

Eager for the association to approve these applications, the African nation of Gabon has already hired Synetics to build a similar system for its port. Later this month, Synetics will install a network with three servers and 20 personal computers running Microsoft Corp.'s LAN Manager, MS-DOS 5.0 and Windows 3.1, as well as Lotus' Notes 3.0 and SmartSuite.

Gabon's port authority will be able to pull data from its IBM RISC System/6000 workstation, which currently runs accounting software, into this system to link financial information with data on port activities, Uttam said.

Synetics chose Notes as a platform for developing Gabon's applications, not only to remain consistent with the other ports' future systems, but also for the software's simplicity and flexibility, Uttam said.

"It's very easy to create applications with Lotus Notes; a lot of functions are prebuilt with templates," he said.

Because Gabon is a small port, its applications will not be as meaty as the prototype applications under development for the association, Uttam said.

But with Notes, Gabon will be able to expand applications to support future growth and add new functions to be consistent with the other ports.

"The port is not really an entity of itself. It needs to talk to outside [authorities], shippers, governments and other ports. One nice thing about Lotus Notes is — although we've designed these modules — people can make their own decisions about what information is passed among the community" and easily modify the applications to fit these changing requirements, he said. Synetics plans to train the Gabonese port's MIS staff using Windows, Notes and the SmartSuite applications, as well as the port-management applications.

Synetics will also use Lotus Notes to make more complex changes in Gabon's applications, Uttam said. Synetics does not currently have an office in Africa, so the company will have to add to and modify Gabon's applications remotely.

Object

Continued from page 45

future," said Bob Marcus, chairman of the Corporate Facilitators of Object-Oriented Technology, a group of 250 users from large corporations who discuss emerging products and technologies via the Internet.

Most users agree that the adoption of object technology will be evolutionary, according to the OMG study, which includes interviews with 198 information technology professionals.

The study presents several scenarios about how companies might implement object technology. The most likely scenario, according to the survey, is that companies will embrace object-oriented methodologies and tools as the best way to develop client/server and other applications more quickly and at lower cost. Most vendors have already turned to object-oriented databases, development tools and programming languages, such as C++ and SmallTalk, to expedite the process of building complex applications.

Craig Iskowitz, senior technician at Automatic Data Processing, Inc. in Mt. Laurel, N.J., said he will use new object-oriented development tools, such as Easel Corp.'s Enfin, the next time his group builds a client/server application.

For Iskowitz and other application developers, object-oriented tools offer much greater flexibility to modify or add to an application without having to rewrite existing code. Most users also point to the ability to reuse code in other applications as a major advantage of object technology.

"The idea of not having to build every application line by line, but reusing chunks of code, is very attractive," said Bob Beckley, director of technology planning at Brigham & Women's Hospital in Boston. Beckley said the hospital will likely use the C++ programming language to build many of its new applications, while it gradually converts its existing 10,000 pages of MUMPS code to object-oriented code over the next several years.

According to the OMG survey, some users believe object technology will provide more than just a faster way to develop applications. These users believe object technology has the potential to transform existing application development practices and rearrange vendor-user relations.

According to the users, applications will be built by purchasing objects from different vendors and assembling them in much the same way discrete manufacturers build products from a series of standardized interchangeable parts.

"Packaged applications, as we view them today, will no longer be available. Instead, a variety of vertical class libraries and functional objects will be available," the survey says.

OBSTACLES

The OMG survey, however, revealed a number of obstacles that are preventing object technology from catching on as quickly as many industry observers once predicted.

Chief on the list are a lack of standards that prevent interoperability of objects built using different programming languages. Also, there is no standard mechanism that enables objects from different vendors to exchange messages across a network.

However, OMG plans to address this interoperability problem in Version 2.0 of its Common Object Request Broker Architecture, due out in 1994.

Other barriers to the widespread adoption of object technology include the failure of vendors to adequately help users rethink applications in an object-oriented fashion, the lack of successful user implementation stories and the complexity of current object-oriented programming languages.

The survey also notes that few users understand the benefits object technology can provide outside of code reuse. These include the development of a common interface that can be deployed across multiple platforms and support for multimedia data.

✆OMG: (508) 820-4300.

Help desk software targets quality assurance, call tracking

BY WAYNE ECKERSON

Mountain View, Calif.

The Vantive Corp., previously known as Proactive Software, Inc., last week announced a new client/server version of its help desk software as well as joint marketing partnerships with Oracle Corp. and Inference Corp.

Vantive 2.0 adds support for two new modules designed to manage quality assurance and call-tracking applications — Vantive Quality and Vantive Support, respectively.

Vantive Quality helps companies track quality through a product's entire life cycle, from design and development to installation and maintenance. Among other things, it defines and monitors quality objectives, controls changes and defects, tracks installations and maintains documentation.

LUONGO

It is designed to help companies comply with the International Standards Organization 9000 international quality standards, which are critical for selling products abroad, according to John Luongo, president and chief executive officer of Vantive.

Vantive Support is a call-tracking application designed for low- and high-volume customer support environments. It can send data about a product problem to Vantive Quality, request a resolution from engineering, receive facsimiles and work-arounds, and report back to the customer.

Vantive 2.0 runs on Windows personal computers and Sybase, Inc. SQL Server databases across Transmission Control Protocol/Internet Protocol networks. The new version adds support for new platforms and will enable users to deploy the Oracle7 database or databases from Informix Software, Inc. It also adds support for Apple Computer, Inc. Macintosh and Unix clients running Motif or OpenLook graphical interfaces. The product adds support for IBM RISC System/6000 and Hewlett-Packard Co. 9000 Unix servers. It currently runs on Sun Microsystems, Inc. SPARCstations.

Version 2.0 of the help desk software also adds new features to its core functionality. The product's Workflow Manager features time-sensitive alarms that can be triggered when a condition persists beyond a specified time. Alarms can send an action item to a specified in box, and execute a stored procedure or third-party application to escalate the alarm.

The product also boasts new interfaces to external resources, including Unix electronic mail and automatic call distributors.

As for partnership agreements, Vantive will resell Oracle's Oracle7 database management system and Inference's CBR Express family of case-based retrieval products. Oracle has agreed to jointly market Vantive applications on Oracle7 databases.

Vantive 2.0 costs $37,500 for a 10-user license and will be available in September.

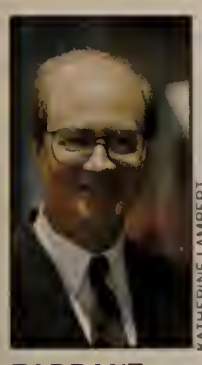
✆Vantive: (415) 691-1500.

Client/server

Continued from page 46

management, and mobile computing.

Specifically, the demonstration links clients comprising Sun Microsystems, Inc. SPARCstations, Apple Computer, Inc. Macintoshes and IBM OS/2s to a token-ring network running a variety of network protocols, including Transmission Control Protocol/Internet Protocol, Network Basic I/O System and IBM's Advanced Peer-to-Peer Communications. On the back end, there are a variety of IBM servers — specifically, OS/2, RISC System/6000, Application System/400 and ES/9000 — running multivendor databases, including IBM's DB2 and IMS and Sun's SQL Server. Each server also runs IBM's CICS transaction processing software, and some run the Open Software Foundation, Inc.'s Distributed Computing Environment.



KATHERINE LAMBERT

TARRANT

Applications used in the demonstration include Lotus Development Corp.'s Lotus Notes and cc:Mail, Microsoft Corp.'s Excel and IBM's Time and Place/2 system.

Also at Client/Server East, Intersolv, Inc. announced a new release of its Excelerator II design tool for building client/server applications. The release includes a diagram editor to simplify data, process and event modeling tasks, and a guide to assist users in developing client/server applications.

ComNet is the only global networking show.

Networking is the hot topic of the nineties, but who has time to go to a dozen networking trade shows?

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The LAN-based shows concentrate on technical "interoperability" issues. Important issues, to be sure, but not the big picture.

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ComNet also deals with real-world solutions like imaging, voice, data, workgroup and database applications that are driving networking technology.

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Editorial

You may not realize it, but you're involved in a legal struggle of profound dimensions — a struggle that will irrevocably alter our definitions of privacy, ethics and individual rights.

It's no secret to technology professionals that our growing dependence on electronic communications has raised questions about workplace privacy and ownership of digital information. But, with the help of the mass media, these issues are becoming the concern of end users everywhere.

Case in point: In July, *NBC News* aired a one-hour special report during prime time on privacy in the information age, which spotlighted such cases as Epson America, Inc.'s monitoring of employee electronic mail.

That kind of attention has pushed the issues involved in high-tech privacy so far to the forefront that Congress is moving ahead with legislation that could — for better or worse — establish broad individual rights to corporate information (*NW*, Aug. 23, page 6).

More and more employees are demanding to know: Where do my privacy rights end? Do I own the E-mail messages and computer files I exchange with coworkers? Does the company have the right to access or monitor my files and messages?

As the point person for communications within your organization, you're embroiled in this controversy. If you haven't established policies and procedures to clarify your organization's stance on privacy issues and use of computing facilities, you stand a good chance of getting mired in some sticky situations down the road. If your company winds up facing a lawsuit, a good many people on both sides of the issue will turn to you.

Drafting a corporate policy on privacy and monitoring is difficult, and you're virtually certain to antagonize someone along the way. This is where networking of the human sort comes in. Meet with upper management, end users and your own legal department to begin formulating ideas. More importantly, talk with your peers at other companies and find out what they've done in this area.

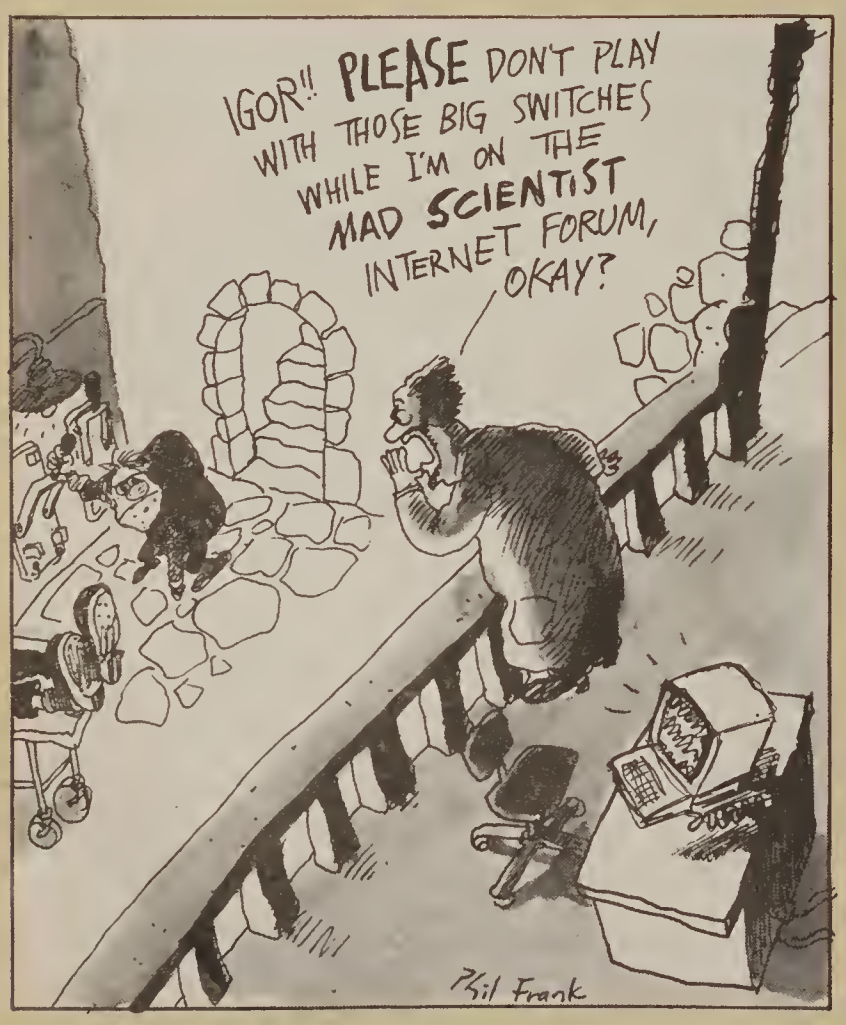
To get that ball rolling, I'd like to hear your ideas on privacy in the workplace. Do companies "own" all the information that is created and transmitted with their equipment? What policies and procedures has your company adopted? Do you warn end users that their E-mail may be monitored?

I'll pass along the information in columns and Letters to the Editor.

CHARLES BRUNO

Teletoons

FRANK AND TROISE



DISTRIBUTED COMPUTING

By John R. Rymer

Forward-looking AppWare needs fleshing out

Despite outward appearances, Novell, Inc.'s recent announcement of AppWare is very big news for users and developers (*NW*, July 5, page 1). Hidden beneath the statements of strategic goals and vague architectural slides Novell used at the announcement is an innovative and comprehensive strategy to support construction of distributed applications. AppWare promises to dramatically simplify the development of distributed applications. Moreover, it is comprehensive. AppWare is actually a series of development facilities that support various styles of development and developers with varying degrees of expertise.

AppWare is the key to Novell's attempt to make NetWare the leading platform for distributed applications development. If Novell hopes to grow during the future, it must enlarge the presence of NetWare as an application platform. Novell's following among independent software vendors (ISV) and corporate developers is currently far too small to ensure that growth.

With AppWare, Novell is offering two pieces of bait to entice ISVs and corporate developers.

The first is a powerful, portable development environment that allows developers to deploy applications on several different client platforms using a single base of software code.

The second is AppWare's support of modular software. AppWare allows developers to write applications using prebuilt components. AppWare also allows ISVs and developers to create new prebuilt components.

Much has been made of Novell's investments in object-oriented technology during the last year, and AppWare puts a face on these investments. That face is components, not objects. The difference between the two is subtle. Software components are constructed using objects, but developers need not understand object-oriented programming to use a component.

There are five points to understand about AppWare at this time.

First, AppWare doesn't replace the facilities Novell uses to support conventional application development methods; it adds to them. Developers who prefer to work in C with conventional application program interface (API) libraries can continue to do so, rather than having to adopt new object-oriented programming techniques and tools.

Indeed, AppWare gives these developers a new portable set of APIs for Novell's many supported client platforms — something Novell never offered before.

Second, AppWare makes component software a reality. It relies on two kinds of components: class libraries and AppWare Loadable Modules (ALM).

Class libraries provide access to file, print, image management, telephony and other services running on NetWare servers. These class libraries will be written in the Object Management Group's Interface Definition Language (IDL), the only vendor-neutral standard for object definitions. This will help to ensure Novell's class libraries will interoperate with IDL class libraries from other vendors.

ALMs are prepackaged functions that are often used in applications. For example, Novell has demonstrated ALMs that automate transmission of a document via electronic mail.

The difference between IDL class libraries and ALMs is in their scope and level of detail. IDL objects will be created by Novell and its systems partners to encapsulate the thousands of minute functions provided by NetWare services. These objects constitute the low-level plumbing of AppWare that supports applications; consequently, users never see the IDL objects.

ALMs will be created by ISVs and corporate developers, often using network services made available through IDL classes. Unlike IDL objects, ALMs are visible to users.

Third, the glue that ties the two levels of components together is called the AppWare Foundation. This is a layer of APIs that ensures portability of application code across all of Novell's supported client platforms with high fidelity. The IDL classes will be accessible via this layer, even though the AppWare Foundation is not object-oriented.

Fourth, Novell does not intend to enter the development tools market in a big way and, therefore, is dependent on other parties to develop tools for use with AppWare. The only serious tool Novell has is AppWare Visual Builder, formerly known as Serius Developer. It is a graphical environment for assembling applications using objects and defining objects for use in applications. If Novell tools partners such as PowerSoft Corp. and Gupta Corp. don't begin building and using ALMs, the AppWare strategy will fail.

Fifth, as usual, Novell's vision far outstrips its deliverables. Novell has described the environment it intends to create to support application development, but hasn't done all of the work to complete that environment yet.

But that's OK for now. At least Novell finally has charted an application development strategy that is attractive and coherent.

AppWare stands well as a development platform. It gives systems-level developers opportunities to create detailed object classes using an industry standard, IDL. It also gives developers the opportunity to package their products as ALMs, making use of the IDL objects under the covers. In addition, tools for constructing ALMs hold the promise of allowing sophisticated end users to build their own applications.

However, Novell needs to get much more specific about its AppWare plans and what those plans will mean to developers and ISVs. Novell also needs to clearly chart the differences between AppWare and Microsoft's Object Linking and Embedding 2.0 strategy for supporting component software. And finally, Novell needs to invest heavily in training for its developers if it expects them to make full use of the AppWare environment.

Despite AppWare's strengths, people won't use what they can't understand.

Rymer is vice president of the Patricia Seybold Group and editor in chief of the "Distributed Computing Monitor," a monthly report on distributed computing architectures, implementations and tools. He may be reached at (617) 742-5200 or via the Internet at jrymer@mcimail.com.

USER FORUM

By Ben Rothke

RAM and storage: cheap net gifts

Numerous articles and industry analysts have recently griped about the ever-growing random-access memory and disk storage requirements of the new, advanced operating systems such as IBM's OS/2 2.1, Microsoft Corp.'s Windows NT, NeXT Computer, Inc.'s NeXTStep and Novell, Inc.'s NetWare 4.0. These criticisms are short-sighted and have no basis compared to the global perspective of the products' contribution to user businesses and the cost of server memory as a component in the enterprise.

We saw this matter of RAM- and disk-bashing as recently as the June 21 issue of *Network World* ("Easing the pain of a NetWare 4.0 upgrade," page 1). There, in describing NetWare 4.0, the authors look back to the good old days when NetWare 3.11 only needed 10M bytes of hard disk space and 4M bytes of RAM, as opposed to the 55M bytes of hard disk space and 12M bytes of RAM required for the memory-voracious NetWare 4.0 (and 16M bytes of RAM if you want decent performance).

We are fortunate today to have RAM costs of less than $50 per megabyte and large-format hard drives hovering at $1.50 per megabyte. With memory and storage costs this low, and prices constantly dropping, what reputable technologist would protest high memory and storage specifications? Even with all of the griping about memory requirements, no self-respecting network architect or engineer would install a mission-critical server with less than 16M bytes of RAM and a 1G-byte Small Computer System Interface drive to operate in a production environment.

Organizations have no qualms about spending $200 per hour for a total quality management consultant, $300 per fiber-optic run to link a workstation to the network or $1,500 per day for on-site corporate training.

However, when it comes to spending $400 for an extra 8M bytes of RAM or an additional $2,750 for a multigigabyte hard drive, the operating system is then accused of being a memory and storage hog. Why is there a double standard when it comes to memory and storage? These features simply don't get any respect.

One can easily become overwhelmed by base system requirements while ignoring the global perspective of what needs the technology can fulfill. Yet concepts such as electronic mail, group scheduling and rightsizing are more than just buzzwords — they are concrete technological concepts that can be applied today and permit businesses to boost productivity and reduce expenditures.

It is ironic that the information systems managers of yesteryear — who gave IBM billions of dollars in lease payments — scream when a $15,000 fault-tolerant Redundant Array of Inexpensive Disks (RAID) system is introduced or a high-speed data connection is proposed.

Looking at the global perspective, a true client/server environment is a cost-intensive venture. The expenditures are neither inconsequential nor for the financially fainthearted. Yet the reward of this rightsizing is that we are freed from the shackles of the excessively expensive mainframe.

Those who bash the memory and storage specifications of the advanced computing environments are either blind to the necessities of these systems or need filler for their columns.

As we tear up our expensive and confining leasing agreements on proprietary mainframes and forget about our quarterly software license renewals, who will have the gall to complain that the cutting-edge, open-system operating system that took hundreds of man-years to test and develop requires more than 640K bytes of RAM to run and 20M bytes of storage?

Memory and storage are cheap gifts to the global enterprise, so please don't look them in the mouth.

➾ Rothke is director of network computing for the National League for Healthcare in New York and a Certified NetWare Engineer. He can be reached on CompuServe at 74710,3325.

Letters

Classes not needed

I am a CNE and strongly disagree with the views stated by Douglas Welch (Aug. 2, page 33).

First, it does not cost $6,300 to become a CNE; it only costs $595 ($85 per test for seven tests). The additional costs cited by Mr. Welch are for classes and books to prepare a person to take the tests. I used the manuals that come with NetWare and passed all seven tests on my first try without taking any classes or paying for any additional books.

Mr. Welch states that the costs of these classes and books is preventing "otherwise qualified" applicants from obtaining the CNE certification.

If they are truly qualified, they should be able to pass the tests without paying for any additional training. If they need the classes and books to pass the tests, then they should be glad that all they have to do is pay money to get a certification that they are not truly qualified to acquire, rather than spend years working with the product as I have.

Sean Stanton
Network engineer
Trawick & Associates
North Potomac, Md.

Author's response: While I'm glad Mr. Stanton was able to pass his CNE tests without books or training, he presents an interesting conundrum. He obviously worked with networks for a long time before he received his CNE.

Today, it is a classic "chicken-and-egg" story. You can't get a CNE until you have experience, but you can't get experience until you have a CNE. As stated in my column, many companies are requiring CNEs as a condition of employment. These people would get on-the-job experience if they could, but Novell and personnel departments are using the CNE program to create an artificial barrier to gaining this experience.

The CNE program is designed to create qualified CNEs, not to validate experience. If a CNE is to become a prerequisite for hiring a network manager or engineer, then the CNE program should be available to all at a reasonable price.

NEARmiss

I would like to clarify several generalizations and correct an inaccuracy in the Internet service providers Buyer's Guide (July 19, page 31).

With a broad brush, you characterize the New England Academic and Research Network (NEARNET) and the regional Internet service providers as noncommercial entities funded by the National Science Foundation (NSF) and catering primarily to the academic and research communities. NEARNET has been financially independent since its inception and has never received funding for its operations from NSF. NEARNET's services support a variety of organizations. Most of them are commercial firms.

In your discussion of commercial traffic and the Acceptable Use Policy (AUP), you say of the Commercial Internet Exchange (CIX) members:

"These independent networks provide all of the same application services available on the Internet and can pass traffic to any part of the Internet." Note that CIX members do not have (via the CIX) commerical access to sites on the NSFNET backbone.

At this time, only Advanced Network and Services, Inc.'s ANS CO+RE has commercial access to these sites. For this reason, NEARNET is both a member of the CIX and uses ANS CO+RE to provide the most extensive commercial Internet connectivity available.

We at NEARNET were surprised that the differences in commercial connectivity among providers were omitted from your analysis.

I commend you for a remarkable job covering the complex subject of Internet services, and look forward to *Network World*'s continued coverage of the topic.

John Curran
NEARNET product manager
BBN Systems and Technologies
Cambridge, Mass.

Digital signatures, again

Walt Roehr's letter (July 26, page 97) notes that bundling an encrypted copy of a message along with the original adds no security. In the most common scenario of encryption, I disagree.

His analysis notes that if Mary sends an encrypted term paper to John, then he can decrypt it and sub-

See Letters, *page 52*

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Help desk

Continued from page 2

Update course (#526). This course will mainly expose you to the terminology and new utilities included with 4.0. There are four other courses available for 4.0, ranging from system administration to installation and configuration.

For more information on upgrading to NetWare 4.0, see Network World*'s article, "Easing the pain of a NetWare 4.0 upgrade," by Jim Brown and Stephen Mattin in the June 21, issue (page 1).*

I am currently working on a project implementing Domain Name System (DNS) services for Internet access. We have 10 sites nationwide and plan to have DNS services at a minimum of five locations. How should the zones be allocated in this environment?

Cung Nguyen, Washington, D.C.

Ed Krol, author of The Whole Internet User's Guide and Catalog *and assistant director for LAN deployment at the University of Illinois at Urbana-Champaign, and Paul Pomes, a senior research programmer at the University of Illinois, reply:*

Three hints for allocating zones (the words between the dots in a domain name like "machine.marketing.thefirm.com") are:

1. Allocate zones to follow the lines of authority in the organization. If you are organized by function, allocate them to functions (such as marketing or manufacturing). If you are organized by location, allocate one per office or area (for example, "midwest").

2. Design the DNS data maintenance and update procedure so that it works. This may mean ignoring the structure suggested above. If each location has its own system support staff, then having that support staff care for its domain data and perhaps a server is a possibility.

3. Remember that you can have multiple names for the same computer, and a computer's name may not disclose anything about its location. Let's say you decide to allocate a zone to each service area ("midwest.thefirm.com"). What if there is a vice president in each area that still belongs to central management? You can certainly name the vice president in the Chicago office "vp.mgmt.thefirm.com" even though every other machine in that office has a name in the "midwest" zone.

My second suggestion, however, should be paramount in your thinking. There is a lot of ego and empire-building associated with naming. The bottom line is that if the domain system doesn't work, people won't be able to communicate.

What is a good source to learn about communications protocols? Can you recommend some books or publications, and where I can get them?

Jeff Naumann, Florissant, Mo.

Rick Meisch, a network engineer at International Network Services, a consultancy specializing in internetworking in Dallas, replies:

There are three books in a series by William Stallings called Handbook of Communication Standards *(Macmillan Publishers, Inc.) that give a general view of data communications, especially the lower layers. For an upper-layer protocol like the Transmission Control Protocol/Internet Protocol, I would recommend* Internetworking with TCP/IP *by Douglas Comer (Prentice-Hall, Inc.). You can probably find these at most book stores and libraries.*

Larry Jarvis network manager of Credit Technologies, Inc. in Waltham, Mass., adds:

A good source for obtaining data communications books is Quantum Books, which has bookstores in Cambridge, Mass., and Philadelphia. They are large bookstores specializing in technical books. They also have excellent personnel that will gladly talk with you to help determine the best books for your needs. In addition, Quantum also sends out a quarterly newsletter announcing new titles before they print and their availability dates. You can reach Quantum by phone at (617) 494-5042, via fax at (617) 577-7282 or via the Internet at quanbook@world.std.com.

Personally, I found the best method for learning the protocols was to study and research the actual protocols standards from CCITT, IEEE, and ANSI. If you are interested in this method, let me know.

Letters

Continued from page 51

mit it to someone else as his own. True, but no one could alter Mary's transmission to John without it being detected. Let's analyze another command scenario:

Alice sends her boss, Bob, a great money-saving idea. She signs an electronic mail message and sends it into a mail system. Eventually, that message would get dequeued from a mail queue and delivered to Bob.

Now suppose that Max has heard of Alice's intent to send a great idea to Bob, so Max gains access to the mail queue. He finds Alice's message, strips off her signature, appends his and requeues the message to be delivered to Bob. Max gets the credit for Alice's idea (and, perhaps, a promotion).

Had Alice encrypted her message with Bob's public key (and, perhaps, her own private key) and sent the encrypted message via E-mail to Bob, Max could have seen that there was a message from Alice to Bob but couldn't have read its contents — he could only corrupt it, delete it or leave it alone.

Since most computer security breaches are "inside jobs," an insider could tamper with a signed message in a manner that is impossible with an encrypted message.

Because the Internal Revenue Service had announced plans to use digital signatures to sign electronically submitted tax returns (Feb. 22, page 6), my original comment reflected my hope that their network would be secure.

Otherwise, encryption would be needed.

Craig Paul
WAN specialist
Kansas University Computer Center
Lawrence, Kan.

Alive and well

Contrary to the assertion made in your Aug. 2 issue ("IBM networking unit may avoid financial hit," page 50), IBM's CallPath product family is in excellent health. In fact, the CallPath family is one of the fastest growing segments in IBM's Networking Systems business.

The CallPath family plays a key role in IBM's Networking Blueprint. We expect it to pay major dividends for our customers and their operations for many years to come.

Marcia Gillespie
Director, Computer-Aided Telephony Systems
IBM
White Plains, N.Y.

Bridging over troubled waters

Despite reaching near commodity status, LAN bridges still provide benefits.

BY MARK A. MILLER

When the mighty Mississippi overflowed its banks this summer, it knocked out utilities to the center of Des Moines, turning it into a ghost town. But it didn't quite wash out all the bridges serving the metropolitan area.

In fact, bridges that linked local-area network segments in the downtown offices of Midwest Power Systems, the utility supplying gas and electricity to Des Moines, kept on chugging away under emergency power. And the utility defied Mother Nature by quickly erecting a new bridge span that enabled workers in a remote temporary office to tap into the LAN downtown and keep flood recovery operations from going under water.

The new bridge span was put in place to get the utility out of a classic catch-22. With no water and limited power available to downtown Des Moines shortly after the flood, the utility's treasury and accounting departments were denied access to their office.

"Without treasury and accounting, we were unable to pay our contractors and proceed with repairs," says Paul Hutson, network analyst at Midwest Power. "We, therefore, had to relocate the entire departments to temporary office space in a vacant building.

After finding a temporary office about 12 miles west of the city, networking staff had to set up a LAN there and link it to the utility's network control center a few miles away. But the distance between the temporary office and the control center exceeded the limitation of the multimode fiber used in the utility's Fiber Distributed Data Interface backbone. To help out the utility, Optical Data Systems, Inc. of Richardson, Texas, flew in converters needed to connect FDDI-compatible multimode fiber at both sites over a laser-driven single-mode fiber cable.

The fiber link enabled the utility to shuttle data between 3Com Corp. NetBuilder II bridges at either site. "Using 3Com's NetBuilder II chassis, we were able to install and configure the local bridge segment [in the temporary office] in under two hours," Hutson says.

"The bridged environment made all the difference in the world; a router based-solution would have taken much longer to install," Huston says. "As it turned out, we went from a vacant building on a Saturday morning to full remote connectivity with 70 active users by the next Tuesday morning. Most importantly, all of these changes were transparent to the end users; they saw no significant difference in their network performance and operation."

Hutson's experience is proof positive that bridges can still play an important role in networking, even as they quickly become commodity products.

With bridging capabilities becoming an integral part of routers and hubs, vendors of freestanding bridges are doing what they can to gussy up their products. Some are even offering bridging software that can run on a variety of computers (see story, page 55).

Bridge designers are also improving algorithms that support local and remote token-ring bridging and looking to add such high-speed LAN interfaces as FDDI over copper and 100M bit/sec Ethernet to their products. Some also plan to support wide-area Asynchronous Transfer Mode (ATM) and frame relay services.

Still other bridge vendors are adding specialized functions such as extensive filtering and data compression to their products and extending service agreements to keep bridged internetworks up and running.

Even as new features are added to bridges, users have to determine whether a bridge or a more functional router will best suit their internetworking needs (see story, page 59). Users deciding to stay in the bridge marketplace can evaluate offerings along several lines, including whether the bridge will pass traffic between local or remote LAN segments, or both.

Users also need to closely examine the type of bridging algorithm supported, as well as the number and types of local- and wide-area interfaces supported. Beyond that, users need to examine filtering and enhanced filtering options, bridge performance, network management and vendor service and support.

High-end bridges will likely support everything a user will ever need, including multiple bridging algorithms, multiple LAN and WAN ports, extensive filtering options, and the ability to access high-speed WAN services such as T-1 circuits.

At the low end, users will find more narrowly focused products, including those with a single bridging algorithm, a few LAN and WAN ports operating at low speed and little in the way of filtering.

TRAVERSING THE BRIDGE

As users undertake the bridge evaluation process, the type of LANs they have will dictate the type of bridging algorithm they will need to steer incoming frames from one interface to another.

Transparent bridging, which uses the IEEE 802.1 standard Spanning Tree Protocol, is used by Ethernet bridges. Transparent bridging examines the data link layer of incoming Ethernet frames and uses bridge-resident lookup tables to make a bridging decision. This algorithm is called transparent because the bridging decision is transparent to end nodes.

When a transparent bridge forwards frames to other LAN segments, those frames traverse the network until the intended receiver picks them up. However, if the intended receiver is down or otherwise unavailable, frames could continuously pass through bridges and chew up needed bandwidth.

Using the Spanning Tree Protocol with transparent bridging eliminates this problem. With Spanning Tree, one bridge that is defined as the root calculates a path to all other bridges and configures the network into a logical series of branches. Once a frame hits the end of a branch, it cannot be forwarded any further.

Token-ring bridges use an algorithm based on the source routing protocol standardized by the IEEE 802.5 committee. With this method, information about the path between a source and destination is carried within the frame itself.

This information designates the specific path a token-ring frame will take through a series of source route bridges from source to destination.

That path is determined through a discovery process in which a workstation broadcasts a special discovery frame, looking for a desired destination.

When the destination hears the discovery frame, it issues a reply, which is returned via multiple paths to the originating workstation.

The workstation stores information about which bridges each response flowed through. When transmitting frames to that destination, the workstation dips into that information and defines the path those frames will take through the internetwork.

Currently, 802.5 standard source routing prevents frames from traversing more than 14 hops on its way to the destination. However, vendors may place a more strict hop limit on their source routing implementations. A seven-hop limit seems to be common.

A hybrid algorithm, source routing transparent, is used to connect Ethernet and token-ring LANs. A source routing bridge examines incoming frames to determine if they contain source routing information. If they do, it uses the defined path. If not, it uses transparent bridging to select the path.

In the FDDI arena, bridges on an FDDI backbone must utilize translation protocols to pass transparent bridge traffic between Ethernets, source routing traffic between token rings or traffic between an Ethernet and a token ring.

Just as LANs are improving in speed and throughput, bridge vendors are enhancing bridging algorithms for greater robustness and performance. A lot of work is being focused on

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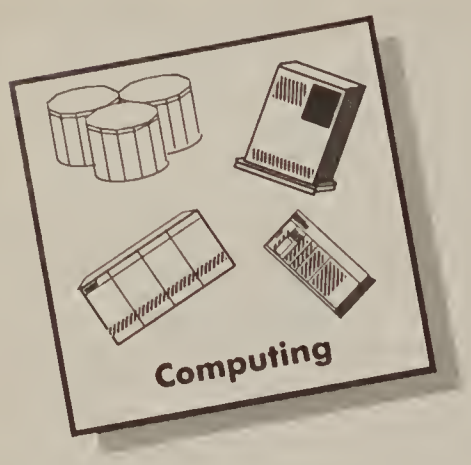

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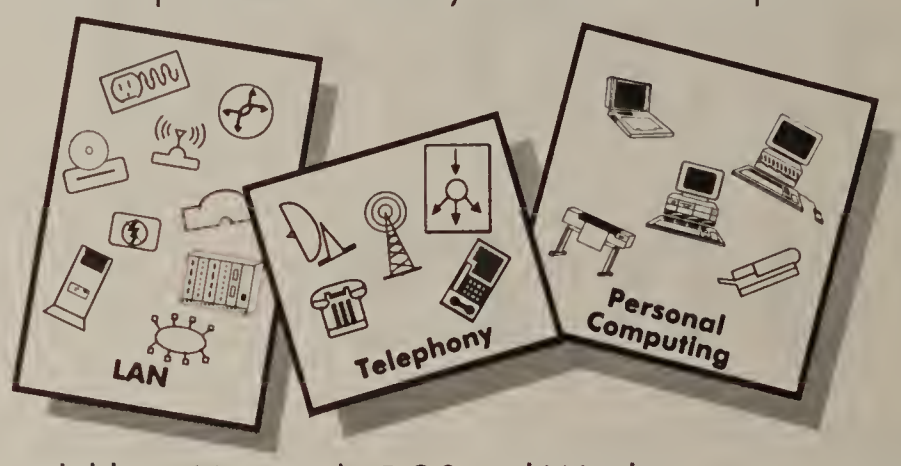

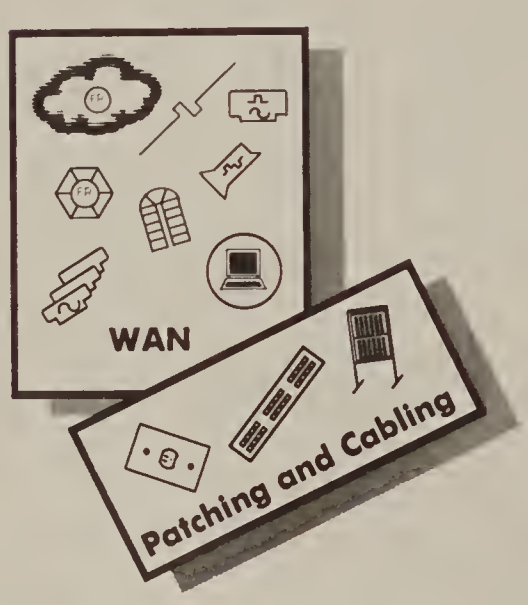

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Continued from page 53

improving source routing.

For example, RAD Network Devices, Inc. (RND) of Huntington Beach, Calif., has developed enhancements for token-ring bridging that reduce the overhead associated with the discovery process by eliminating some of the discovery frame broadcasts that enter the network.

Typically, every time a workstation is turned on, it sends a broadcast of discovery frames over all possible routes in order to collect information needed to reach other nodes on the net. RND converts the all-routes-broadcast frames to a single-route-broadcast frame, thus reducing network overhead.

RND also holds a patent on a concept called the virtual ring. This process enables source routing environments to rapidly recover from internetwork problems. The virtual ring combines the entire WAN connection, or any intermediate LAN connections, into one logical entity.

Virtual ring maintains the appearance of an end-to-end connection to source and destination nodes, even if any intermediate links fail. This eliminates the need for source and destination nodes to rediscover complete paths when failed intermediate links are restored.

RND is also working to define a protocol that will enable remote bridges to communicate. Currently, there is no standard for communication between remote bridges. According to Scott Schultz, RND's vice president of sales, RND has developed a link-state algorithm for remote bridging called Dynamic Shortest Path First (DSPF).

Similar to link state algorithms used in routers, DSPF enables bridges — or routers, for that matter — to communicate to learn each others' status as well as the best and least cost path to take when forwarding frames between each other.

DSPF may be used in either token-ring or Ethernet environments. In addition to calculating the shortest path between bridges or routers, DSPF calculates an alternate path. This permits rerouting to take place quickly should a link failure occur. RND plans to submit DSPF to the Institute of Electrical and Electronics Engineers, Inc. for consideration as a remote bridging standard before the end of this year.

PORT SIDE

Next in importance to the algorithm in choosing a bridge is the number and type of local- and wide-area ports supported.

If the bridge will be used to connect LAN segments, then users will want to make sure the bridge has the appropriate type and number of LAN ports.

There are a vast number of bridges supporting one or more of the popular LAN types — Ethernet, token ring and FDDI. However, users rushing out to acquire newer types of LANs, such as 100M bit/sec Ethernet and FDDI over copper, have fewer choices in bridges.

Perhaps one of the reasons bridge vendors aren't quick to roll out support for these newer

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Bridge on a disk

Just as bridging functionality built into routers and intelligent hubs is making them options to freestanding bridges, users are being given yet another option. Vendors are starting to offer software-only bridges, which require users to supply their own hardware and interface cards.

Software-only bridges come with the advantage of lower cost, but the trade-off is the possibility of decreased functionality, especially in areas such as filtering because the bridge is limited by the processing power of the hardware.

Some internetworks require less rather than more complexity, and in those cases, a software bridge fits the bill. Luther Huffman, technical support supervisor at Cabarras Memorial Hospital in Concord, N.C., selected Triticom's software bridge over a standalone or hub-based alternative. Huffman manages a campus network consisting of 120 users plus one remote location, incorporating Novell, Inc. NetWare, Digital Equipment Corp. DECnet and IBM Systems Network Architecture 5250 protocols.

"Cost was a major factor in our purchase decision," Huffman says. "We have optimized bridge performance by installing [the software] in a fast PC with an Ethernet card with high-speed I/O capability, and have been quite pleased with the results — both with local and remote configurations."

In addition to Triticom, software bridges are sold by Cray Communications, IBM, Microcom, Inc., Novell, Inc. and Olicom USA Inc.

BY MARK A. MILLER

Bridges

Company	Product	Bridge type (L = Local, R = Remote, S = Stand-alone, X = Rack-mountable)	Algorithm (S = Source routing, T = Transparent, Z = Source routing transparent)	Ports (1): LAN	Ports (1): WAN	WAN interfaces: RS-232	RS-422	RS-449	X.21	V.35	Other	Wide-area services accessed: T-1	Fractional T-1	E-1	X.25	Filtering method (B = Broadcast, D = Destination, M = Multicast, P = Protocol)	Filtering 64-byte packets (K packet/sec): Ethernet	Token ring	FDDI	Forwarding (K packet/sec): Ethernet (64-byte packets)	Ethernet (1,518-byte packets)	Token ring (64-byte packets)	Token ring (4,096-byte packets)	FDDI (64-byte packets)	FDDI (4,096-byte packets)	SNMP agent	On-site services: Part of warranty	On-site services: Optional contract	Service and support options (F = Free software upgrades, N = Next-day parts, T = Toll-free hot line)	Price range/ warranty (months)
Advanced Computer Communications (408) 864-0600	ACS 2100	L, S, X	T	2												D, P	14.8			10	.8					✔		✔	N, T	$3,250/12
	ACS 4100	R, S, X	S, T	1	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	D, P	5	5		1	.8	1	.5			✔		✔	N, T	$4,950-$6,450/12
	Nile	R, S, X	S, T	1	2	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	D, P	7	7		3.5	.8	3	.5			✔		✔	N, T	$3,750-$4,050/12
	ACS 4200	L, R, S, X	S, T	2	4	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	D, P	10	10		5	.8	3.6	.5			✔		✔	N, T	$5,750-$8,350/12
	ACCes/4500	L, R, S, X	S, T	41	20	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	D, P	14.8	28	178	14.8	.8	3.6	.5	28	3	✔		✔	N, T	$9,990-$108,665/12
Allied Telesis, Inc. (800) 424-4284	AT-6870 Learning Bridge	L, S, X	T	2												D, P	12.5			12.5	.527									$2,450/12
	AT-6875 SNMP Learning Bridge	L, S, X	T	2												D, P	12.5			12.5	.527					✔			F	$2,995/12
Andrew Corp. (310) 784-8000	Bridgeport/7212	R	S	1	1	✔		✔	✔	✔		✔	✔			B, D, M		31.3				1.9	.08					✔	F, N, T	$2,995-$3,495/12
	Bridgeport/7412	R, X	S	1	1	✔		✔	✔	✔		✔	✔			B, D, M		31.3				1.9	.08					✔	F, N, T	$5,595-$6,095/12
	Bridgeport/7606	L, X	S, Z	2												B, D, M, P		31.3				2.2	.48			✔		✔	F, N, T	$4,995-$6,595/12
	PathWise/7609	L, X	S, T	2												B, D, M, P	14.8	31.3		2.5	.79	1.9						✔	F, N, T	$4,995/12
	PathWise/7622	R, X	S	1	2	✔			✔	✔		✔	✔	✔		B, D, M		31.3				2.2	.08			✔		✔	F, N, T	$5,595-$6,095/12
Artel Communications Corp. (800) 525-2599	StarBridge Turbo	L, S	T	8												B, D, M, P	14.8			14.8						✔	✔	✔	F, N, T	$7,200-$9,900/12
	Galactica	L, X	T	8												B, D, M, P	14.8		120	14.8				100		✔	✔	✔	F, N, T	$16,500-$53,200/12
Calios, Inc. (805) 520-8800	M3440 Token Ring Bridge	L, S	S, T, Z	1												B, D, M, P		30				3.2	.5			✔	✔	✔	F, N, T	$3,995-$5,295/12
Canoga Perkins Corp. (818) 718-6300	8850M Local Bridge	L, S, X	S	2													10			8	.335					✔			N	$3,145-$4,493/12
	8860M Remote Bridge	R, S	S	1	1	✔		✔		✔		✔	✔	✔			8			.300	.125					✔			N	$4,430/12
	8870 Campus Bridge	L, S, X	S	2													10			8	.335					✔			N	$5,945-$6,648/12
Combinet, Inc. (800) 967-6651	Everyware LC ISDN	R, S	T	1	1						✔					B, D, M, P	14.4			.25	.01								F	$1,690/12
	Everyware 200/400 ISDN	R, S	T	1	1						✔					B, D, M, P	14.4			1	.042								F	$2,190/12
	Everyware 600 Switched 56	R, S	T	1	2						✔					B, D, M, P	14.4			.875	.037								F	$2,490/12
	Everyware 150 ISDN-Single User	R, S	T	1	1						✔						NA			1	.042								F	$990/12
Coral Network Corp. (800) 424-3579	Backbone Xpress 1000	R, X	T	20	28					✔	✔	✔	✔	✔		B, D, M, P	14.8	25	164	13.5	.805	25		161	3	✔	✔	✔	F, N, T	$16,500-$90,000/3
	Backbone Xpress 2000	R, X	T	20	28					✔	✔	✔	✔	✔		B, D, M, P	14.8	25	164	13.5	.805	25		161	3	✔	✔	✔	F, N, T	$19,500-$100,000/3
Cray Communications (301) 317-7156	Cray Ethernet MAC Bridge	L, S	T	2												B, M, P	14.8			14.8	.625							✔	F, N, T	$3,195/12
	Cray Internetworking MAC Bridge	R, S	T	1	8	✔			✔	✔	✔	✔	✔	✔	✔	B, M, P	14.8			14.8								✔	F, N, T	$3,290-$5,075/12
	Cray Token Ring Remote Bridge	R	S	1	1	✔			✔	✔		✔	✔	✔		B, M, P		31.3				13	.488					✔	F, N, T	$3,495/12
	Cray Token Ring Local Bridge	L	S	2												B, M, P		31.3				13	.488					✔	F, N, T	$2,995/12
	Cray Token Ring Wire Speed Bridge	L, X	S	2												B, M, P		31.3				27	.488			✔		✔	F, N, T	$5,995/12
	Cray DCP4802 Frame Relay Remote Bridge	R, S, X	T	2	2					✔		✔	✔			B, D, M, P	14.8			10	.625					✔		✔	F, N, T	$3,795-$4,995/12
Develcon Electronics, Ltd. (800) 667-9333	Model-100 Remote Ethernet Bridge	R, S, X	T	1	1	✔	✔		✔	✔		✔	✔	✔		B, D, M, P	14			3	.288					✔			N, T	$2,145-$3,945/lifetime
	Model-120 Remote Ethernet Bridge	L, S, X	T	2												B, D, M, P	13.8			11	.823					✔			N, T	$1,695-$2,495/lifetime
	Model-150 ISDN Ethernet Bridge	R, S, X	T	1							✔					B, D, M, P	13.8			NA	NA					✔			N, T	$2,695/lifetime
	Model-200 Remote Token-Ring Bridge	R, S, X	S	1	2	✔	✔		✔	✔		✔	✔	✔		B, D, M, P		31.3				3	.045						N, T	$3,650-$6,050/lifetime
	Model-220 Local Token-Ring Bridge	L, S, X	S	2												B, D, M, P		31.3				3.6	3						N, T	$3,695/lifetime
Digital Equipment Corp. (800) 344-4825	DECbridge 500 Series	L, S, X	T	2												B, D, M, P	14.8		460	14.8				14.8		✔		✔		$10,000-$16,500/12

Bridges

Company	Product	Bridge type (L = Local, R = Remote, S = Stand-alone, X = Rack-mountable)	Algorithm (S = Source routing, T = Transparent, Z = Source routing transparent)	Ports (1): LAN	Ports (1): WAN	WAN interfaces: RS-232	RS-422	RS-449	X.21	V.35	Other	Wide-area services accessed: T-1	Fractional T-1	E-1	X.25	Filtering method (B = Broadcast, D = Destination, M = Multicast, P = Protocol)	Filtering 64-byte packets (K packet/sec): Ethernet	Token ring	FDDI	Forwarding (K packet/sec): Ethernet (64-byte packets)	Ethernet (1,518-byte packets)	Token ring (64-byte packets)	Token ring (4,096-byte packets)	FDDI (64-byte packets)	FDDI (4,096-byte packets)	SNMP agent	On-site services: Part of warranty	On-site services: Optional contract	Service and support options (F = Free software upgrades, N = Next-day parts, T = Toll-free hot line)	Price range/ warranty (months)
	DECbridge 600 Series	L, S, X	T	3-4												B, D, M, P	NA		460	NA				20		✔		✔		$16,500-$21,500/12
	DECbridge 90/DECbridge 90FL	L, S, X	T	2												D, P	NA			NA								✔		$2,590/12
	LANbridge 150	L, S, X	T	2												B, D, M	NA			NA								✔		$3,495-$4,495/12
	LANbridge 200	L, S, X	T	2												B, D, M, P	NA			NA						✔		✔	T	$4,495-$9,495/12
FiberCom, Inc. (800) 537-6801	RingMaster	L, S, X	S, T	5												B, D, M, P	14.8	3	500	14.8	.812	3	.5	23	.753	✔		✔	F, N, T	$22,000-$27,000/12
Fibronics International, Inc. (617) 826-0099	FER2500 Local Ethernet Bridge	L, S, X	T	2												B, D, M, P	14.8			12.5						✔	✔	✔	F, N, T	Starts at $1,720/6
	FX8610 Workstation Server	L, S, X	T	2													14.8			6						✔	✔	✔	F, N, T	Starts at $16,000/6
	FX8210 FDDI Translation Bridge/Token Ring Bridge	L, S, X	S, T	2												B, D, M, P	12	3.3		6		3.3	3.3			✔	✔	✔	F, N, T	Starts at $10,000/6
	FR9500 Local Token Ring Bridge	L, S, X	S, Z	2														NA				3.3	3.3			✔	✔	✔	F, N, T	Starts at $4,020/6
Gandalf Systems Corp. (609) 424-9400	LANLine 5210	L, S	T	2												B, D, M	14.8			14.8	.82							✔	F, N, T	$499/lifetime
	LANLine 5220	L, R, S	T	1	2	✔	✔		✔	✔	✔	✔	✔	✔		B, D, M, P	14.8			14.8	.82					✔		✔	F, N, T	$2,095-$2,295/24
	Access Bridge	L, R, X	T	1	2	✔	✔		✔	✔	✔	✔	✔	✔		B, D, M, P	14.8			14.8	.82					✔		✔	F, N, T	$3,825-$5,075/12
	LANLine 5220L	L, S	T	2												B, D, M, P	13.4			13.4	.82							✔	F, N, T	$895/24
	LANLine 5211	L, S	T	2												B, D, M, P	14.8			14.8	.82							✔	F, N, T	$1,600/24
Hewlett-Packard Co. (800) 752-0900	HP 10:10 LAN Bridge MB	L, S, X		2												B, D, M	14.8			14.8	NA					✔	✔			$2,950/3
	HP Remote Bridge RB	R, S, X		1	1	✔	✔	✔	✔	✔		✔	✔	✔	✔	B, D, M	14.8			14.8	NA					✔	✔			$2,950/36
IBM (800) 426-2255	IBM 8209 LAN Bridge	L, S, X	S, T	2												B, D, M, P		27				4	.331			✔	✔	✔	T	$6,665-$10,000/12
	IBM LANStreamer Bridge/DOS V1.0	L	S	2												B, D, M, P		27				NA	.487			✔	✔	✔	T	$1,995/3
	IBM Local Token Ring Bridge/DOS V1.0	L	S	2												B, D, M, P		27				3.8	.398			✔	✔	✔	T	$1,495/3
	IBM Remote Token Ring Bridge/DOS V1.0	R	S	1	1	✔			✔	✔	✔	✔		✔	✔	B, D, M, P		27				2.7	.093			✔	✔	✔	T	$2,495/3
ISDN Systems Corp. (703) 883-0933	Multi-Protocol Access Node	R, S	T	2	2	✔	✔	✔		✔	✔	(2)				B, D, M, P	9			4	.5					✔			F, N, T	$1,575-$4,500/12
Intellicom, Inc. (800) 992-2882	Qn-604/B and Qn-604/M	L, S, X		2												B, D, M	14.5			14.5						✔			F	$1,475-$1,975/36
Kalpana, Inc. (800) 488-0775	EtherSwitch EPS1500	L, S, X	T	2												B, D, M	14.8			14.8	.813					✔				$3,750-$15,125/12
	EtherSwitch EPS500	L, S	T	5												B, D, M	14.8			14.8	.813					✔				$3,500-$4,000/12
Lancast (800) 752-2768	ENT-6010 Micro Work Group Bridge	L, S	T	2												B, D, M	14.8			14.8	.812								N, T	$695/36
Lanwan Technologies (408) 986-8899	LW1010 Ethernet Local Bridge	L, S, X	T	2												D, P	14			11						✔			F	$1,650/24
	LW1020 Ethernet Remote Bridge	R, S, X	T	1	1	✔		✔		✔		✔	✔	✔		D, P	14									✔			F	$2,250/24
Madge Networks, Inc. (800) 676-2343	Smart Ringbridge	L, X	S	2												B, D, M, P		30				11	.464			✔			F, N, T	$5,495/12
Micom Communications Corp. (800) 642-6687	NetRunner 1000ED Internetwork Node	R, S, X	T	2	4	✔	✔	✔	✔	✔			✔			B, D, M, P	10			.8	.04					✔			F, N, T	$8,700/36
	NetRunner 1000E Internetwork Node	R, S, X	T	1	4	✔	✔	✔	✔	✔			✔			B, D, M, P	10			.4	.02					✔			F, N, T	$7,250/36
	NetRunner 1000E Internetwork Feeder	R, S, X	T	1	1	✔	✔	✔	✔	✔			✔			B, D, M, P	10			.4	.02					✔			F, N, T	$5,700/36
	NetRunner 500E Internetwork Node	R, S, X	T	1	3	✔	✔	✔	✔	✔			✔			B, D, M, P	10			.4	.02					✔			F, N, T	$4,500/36
	NetRunner 50E Internetwork Feeder	R, S, X	T	1	1	✔	✔	✔	✔	✔			✔			B, D, M, P	10			.3	.01					✔			F, N, T	$2,995/36
Microcom, Inc. (800) 822-8224	Microcom Bridge/Router/6000	R	S, T, Z	1	4	✔		✔	✔	✔		✔	✔	✔		B, D, M, P	14.8	29		NA	NA	NA	NA			✔		✔	N	$4,299-$8,196/12
	Microcom Bridge/Router/6500	R	S, T, Z	1	4	✔		✔	✔	✔					✔	B, D, M, P	14.8	29		NA	NA	NA	NA			✔		✔	N	$4,299-$8,196/12

Bridges

Company	Product	Bridge type (L = Local, R = Remote, S = Stand-alone, X = Rack-mountable)	Algorithm (S = Source routing, T = Transparent, Z = Source routing transparent)	Ports (1): LAN	Ports (1): WAN	WAN interfaces: RS-232	RS-422	RS-449	X.21	V.35	Other	Wide-area services accessed: T-1	Fractional T-1	E-1	X.25	Filtering method (B = Broadcast, D = Destination, M = Multicast, P = Protocol)	Filtering 64-byte packets (K packet/sec): Ethernet	Token ring	FDDI	Forwarding (K packet/sec): Ethernet (64-byte packets)	Ethernet (1,518-byte packets)	Token ring (64-byte packets)	Token ring (4,096-byte packets)	FDDI (64-byte packets)	FDDI (4,096-byte packets)	SNMP agent	On-site services: Part of warranty	On-site services: Optional contract	Service and support options (F = Free software upgrades, N = Next-day parts, T = Toll-free hot line)	Price range/ warranty (months)
	Microcom Bridge/Router/6500	R	S, T, Z	1	4	✔		✔	✔	✔					✔	B, D, M, P	14.8	29		NA	NA	NA	NA			✔		✔	N	$4,299-$8,196/12
Motorola Codex (508) 261-4000	Motorola Codex 6500 plus Token Ring Interface Module	R, X	S	1	6	✔	✔	✔		✔	✔		✔		✔	B, D, M, P		NA				.32	.32			✔	✔			$1,450/12
Network Application Technology, Inc. (800) 543-8887	LANB/100M Local Ethernet Bridge	L, S	T	2												B, D, M, P	12			7	NA					✔			T	$1,650-$1,795/12
	LANB/220M Remote Ethernet Bridge	R, S	T	1	2	✔	✔	✔	✔	✔	✔	✔	✔	✔		B, D, M, P	12			NA	NA					✔			T	$1,850-$2,695/12
	LANB/220M Remote Compression Bridge	R, S	T	1	2	✔	✔	✔	✔	✔	✔	✔	✔	✔		B, D, M, P	NA			NA	NA					✔			T	$2050-$2,295/12
Network Express, Inc. (313) 761-5005	NE ISDN Bridge	R, S, X	T	1	8	✔				✔	✔	✔	✔	✔		B, D, M, P	14.8			14.8	.812					✔		✔	F, N, T	$6,500-$22,100/12
Network Systems Corp. (510) 440-2380	5000 Series	R, S, X	T	1	2	✔	✔	✔	✔	✔	✔	✔	✔	✔		B, D, M, P	14.8	20			7	1.2				✔		✔	F, N, T	$6,000-$12,950/12
Networks Northwest, Inc. (206) 641-8779	BReeze 1000	R, S, X	S, T	1	1						✔					B, D, M, P	3.6			.15	.007					✔			F, N, T	$2,950/12
	BReeze 1100	R, S, X	S, T	1	1	✔										B, D, M, P	3.6			.585	.025					✔			F, N, T	$2,650/12
	BReeze 1200	R, S, X	S, T	1	1	✔										B, D, M, P	3.6			.585	.025					✔			F, N, T	$2,650/12
Newbridge Networks, Inc. (703) 834-3600	8230 Mainstreet Ethernet LittleBridge	L, R, S, X	T	2	2	✔	✔	✔	✔	✔	✔	✔	✔	✔		D	14.8			14.8	1.8					✔		✔	N, T	$1,900-$3,500/12
Novell, Inc. (801) 429-7000	NetWare MultiProtocol Router V2.1	L, R	S	6	16	✔	✔		✔	✔		✔	✔	✔	✔	P		25				14.8	.496			✔			T	$995-$1,495
Olicom USA, Inc. (214) 423-7560	Olicom Wire Speed Local Bridge 16/4	L, X	S	2												D, P		65				19	.49			✔	✔	✔	F	$3,500-$4,000/36
	Olicom Remote Bridge 16/4	R	S	1	1				✔	✔	✔	✔	✔	✔		D, P		65				3.4				✔	✔	✔	F	$2,000-$2,500/36
	Olicom Local Bridge 16/4	L	S	2												D, P		65				9.5	.5			✔	✔	✔	F	$1,800-$2,100/36
Pennl Datability Networks (301) 921-8600	Series 7400	L, R, S, X		16	18	✔			✔	✔		✔	✔	✔	✔	B, D, M, P	14.8			14.8	.811					✔			N, T	$9,000-$20,000/12
	Series 2500	L, R, X	S, T, Z	20	1	✔										B, D, M, P	14.8	3.9	446.5	14.8	.813	3.9	3.9	59.5	NA	✔			N, T	$15,000-30,000/12
	Series 5000	L, R, S, X		4	4	✔			✔	✔		✔	✔	✔	✔	B, D, M, P	14.8			14.8	NA					✔			N, T	$5,500/12
	Series 1200 Model 1210	L		2												B, D, M, P	14.8			11	.813					✔			N, T	$2,895/12
	Series 1200 Model 1220	R		1	2	✔				✔		✔	✔	✔		B, D, M, P	14.8			NA	NA					✔			N, T	$3,195/12
	Series 1200 Model 1230	L	S, T	2												B, D, M, P		3.9				3.6	3.6			✔			N, T	$4,995/12
	Series 1200 Model 1240	R	S, T	1	2	✔				✔		✔	✔	✔		B, D, M, P		3.9				NA	NA			✔			N, T	$7,395/12
Persoft, Inc. (800) 368-5283	Intersect Remote Bridge-Token Ring	R, S	S	1	1						✔					D, P		6				4.1	.064					✔	F, N	$6,995/12
	Intersect Remote Bridge- Ethernet	R, S	T	1	1						✔					D, P	14			4.1	.172							✔	F, N	$6,495/12
RAD Data Communications, Inc (201) 529-1100	TrimBridge	R, S	T	1	2	✔	✔		✔	✔						B, D, M	14.8			3.1	NA								T	$2,500-$3,500/12
	TRE	R, S	T	2	2	✔	✔		✔	✔	✔					B, D, M		60				1.8	.128						T	$800-$2,100/12
	MBE	R, S	T	1	2	✔	✔		✔	✔	✔					B, D, M	14.8			NA	NA									$800/12
RAD Network Devices, Inc. (714) 891-1446	Local Ethernet Bridge	L, S, X	T	2												B, D, M, P	14			14	.8					✔	✔	✔	F, N, T	$1,495-$1,695/12
	Local Token Ring Bridge	L, S, X	S, T, Z	2												B, D, M, P		40				3.4	.48			✔	✔	✔	F, N, T	$3,495-$5,495/12
	Local Token Ring to Ethernet Bridge	L, S, X	S, T, Z	2												B, D, M, P	14.4	40		2	.75	2	.25				✔	✔	F, N, T	$5,995/12
	Remote Token Ring Bridge	R, S	S, T, Z	1	4		✔	✔	✔	✔	✔	✔	✔	✔	✔	B, D, M, P		20				2	.09			✔	✔	✔	F, N, T	$4,000-$7,150/12
	Remote Ethernet Bridge with Compression	R, S, X	T	1	1	✔	✔	✔	✔	✔						B, D, M, P	14.8			3.3	.139					✔	✔	✔	F, N, T	$3,000-$4,000/12
	Remote Ethernet Bridge	R, S	S, T, Z	1	4		✔	✔	✔	✔	✔	✔	✔	✔	✔	B, D, M, P	14			3	.245					✔	✔		F, N, T	$4,000-$7,535/12
Retix (800) 255-2333	2265 Local Bridge	L, S, X	T	2												B, D, M, P	12			8.4	.8					✔			F, T	$1,750-$1,845/12
	4810 Remote Ethernet Bridge	R, S, X	T	1	1	✔		✔	✔	✔	✔	✔	✔	✔	✔	B, D, M, P	9			1.2	1.2					✔			F, T	$3,195-$3,695/12
	4850 Remote Ethernet Bridge	R, S, X	T	1	2	✔		✔		✔	✔	✔	✔	✔	✔	B, D, M, P	9			1.2	.8					✔			F, T	$4,950-$7,450/12
SpreadNet, Inc. (214) 247-5021	SpreadNet Link	R, S	T	10		✔				✔	✔	✔	✔			B, D, M	14.8			2.5	.1						✔	✔	F, N	$6,000-$15,000/12
Technically Elite Concepts, Inc. (800) 659-6975	Interchange	L, S	T	4												B, D, M, P	NA			14.8						✔			F, N, T	$3,995-$9,950/3

Bridges

Company	Product	Bridge type	Algorithm	Ports (1)		WAN interfaces						Wide-area services accessed				Filtering method	Filtering 64-byte packets (K packet/sec)			Forwarding (K packet/sec)						SNMP agent	On-site services		Service and support options	Price range/ warranty (months)
		L = Local R = Remote S = Stand-alone X = Rack-mountable	S = Source routing T = Transparent Z = Source routing transparent	LAN	WAN	RS-232	RS-422	RS-449	X.21	V.35	Other	T-1	Fractional T-1	E-1	X.25	B = Broadcast D = Destination M = Multicast P = Protocol	Ethernet	Token ring	FDDI	Ethernet (64-byte packets)	Ethernet (1,518-byte packets)	Token ring (64-byte packets)	Token ring (4,096-byte packets)	FDDI (64-byte packets)	FDDI (4,096-byte packets)		Part of warranty	Optional contract	F = Free software upgrades N = Next-day parts T = Toll-free hot line	
Telco Systems, Inc. (617) 255-9400*	Series 3000HCB-E	R, X	S, T	1	1	✔	✔	✔	✔	✔	✔	✔	✔	✔		D, P	14.8			7	.8					✔			N, T	$7,500/12
	Series 3000HCB-T	R, X	S	1	1	✔	✔	✔	✔	✔		✔	✔	✔		D, M		50				2.8	.250						N	$7,500/12
3Com Corp. (800) 638-3206	NetBuilder Token Ring (local)	L, S, X	S, T, Z	2												D, M		30				4	.6			✔		✔	F, N, T	$5,995/12
	NetBuilder Token Ring (remote)	R, S, X	S, T, Z	2	2	✔		✔		✔		✔		✔	✔	D, M		30				3.5	.045			✔		✔	F, N, T	$11,225/ 12
	NetBuilder (local)	L, S, X	T	2												B, D, M	9			9	2					✔		✔	F, N, T	$4,745- $5,145/12
	NetBuilder II	L, R, S, X	S, T, Z	8	8	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	B, D, M, P	NA	35	900	NA	NA	3.9	.48	40.6	3	✔		✔	F, N, T	$10,495- $30,000/ 12
Triticom (612) 937-0772	BridgeIT/r	R	T	1	1	✔										B, M	14			.09	.004					✔			F, N	$695/2
	BridgeIT	L	T	2												B, M	14			10	.725					✔			F, N	$695/2
Xyplex, Inc. (800) 338-5316	3210 Local Bridge	L, S, X	T	2												D, P	14.8			8.5	.802					✔	✔	✔	F, N, T	$3,095/36
	6220 Remote Bridge	R, S, X	T	1	2	✔	✔		✔	✔	✔	✔	✔	✔	✔	D, P	14.8			3.5	.13					✔	✔	✔	F, N, T	$3,295/36
	3310 Ethernet-to-FDDI Bridge	L, S, X	T	2												D	14.8		446	14.8				14.8		✔	✔	✔	F, N, T	$9,995- $18,495/ 36
ZNYX Advanced Systems Division, Inc. (510) 249-0800	Net-2-Net	L, S	S, T	2		✔										D	12			5.9	.679					✔			F, N	$995- $1,250/12

Products highlighted by color were selected for The Short List.

*Magnalink Communications Division

NA = Not available

Footnotes:
(1) See filtering rates for type of LAN supported.
(2) Operates at these speeds, but service accessed is frame relay.

SOURCE: DIGINET CORP., BROOMFIELD, COLO.

Continued from page 55

technologies is that the ink hasn't quite dried on the standards. For instance, there are two competing standards for 100M bit/sec Ethernet.

The "100BASE-X" proposal, supported by Grand Junction Networks, Inc., 3Com, SynOptics Communications, Inc. and Intel Corp. uses a carrier-sense multiple access with collision detection (CSMA/CA) access scheme, but requires an additional physical link layer that runs over data-grade unshielded twisted pairs.

Coral Network, ISDN Systems Corp., Microcom, Inc., Telco Systems' Magnalink Communications Division, 3Com and Xyplex, Inc. support frame relay.

In contrast, the "100BASE-VG" proposal, pushed by Hewlett-Packard Co., Ungermann-Bass, Inc. and AT&T Microelectronics, defines new access and signaling methods for use over voice-grade unshielded twisted pairs.

Vendors planning to support one or the other 100M bit/sec Ethernet option include 3Com, Calios, Inc., Combinet, Inc, Kalpana, Inc., Hewlett-Packard Co., Lanwan Technologies, Micom Communications Corp. and Network Application Technology, Inc.

FDDI over copper is another new high-speed LAN that bridge vendors are starting to support. Currently in front of the ANSI X3T9.5 committee, this standard is expected to be finalized in the very near future.

Among the vendors planning to support FDDI over copper are Telco Systems, Inc.'s Magnalink Communications Division, Calios, Coral Network Corp., Penril Datability, SpreadNet, Inc. and Fibronics International, Inc.

On the wide-area side, most bridges today support traditional T-1/E-1 and fractional T-1, as well as switched digital services such as switched 56K bit/sec Integrated Services Digital Network Basic Rate Interface circuits and X.25. However, bridge vendors are supporting a number of emerging WAN technologies today, including frame relay and Switched Multimegabit Data Service (SMDS).

Coral Network, ISDN Systems Corp., Microcom, Inc., Telco Systems' Magnalink Communications Division, 3Com and Xyplex, Inc. are among the vendors supporting frame relay. Support for SMDS is not as popular, with only 3Com and Advanced Computer Communications (ACC) indicating support.

Of the vendors surveyed for this Buyer's Guide, only 3Com claims to support wide-area ATM services.

THE LOGICAL SIEVE

Another important factor to consider when choosing a bridge is the filtering technique. In their most simplistic applications, bridges look at the media access control (MAC) address in the data link layer of LAN frames to decide whether the frames should be placed in a queue for forwarding to another LAN segment.

This filtering has traditionally been limited to looking for specific source and destination MAC addresses, multicast addresses that enable frames to be forwarded to several destinations at once or broadcast addresses that enable frames to be forwarded to all destinations. Most bridges support destination, multicast and broadcast filtering.

More extensive filtering, which operates on the data within frames, is being incorporated into many products today. For example, Network Application Technology (NAT) of Campbell, Calif., products can be configured to examine any 12-octet sequence (a string of 96 bits) within the first 256 octets of the frame.

This enables the products to peek into

To bridge or route?

Before setting out to buy a bridge, users have to decide whether it is the appropriate tool for interconnecting local-area networks.

Both bridges and routers interconnect local or remote LANs, but they operate differently.

Bridges forward frames from one LAN segment to another based on information derived from the frame's data link layer, the second layer of the seven-layer Open Systems Interconnection model. As such, bridges are transparent to higher layer network protocols.

Routers operate at the network layer, the third layer of the OSI model. Routers examine network packets, which contain the frames that bridges forward, and make more intelligent decisions about how to forward data.

Router-based internets require all devices to support a consistent network layer protocol, such as the Internet Protocol, or Novell, Inc.'s Internetwork Packet Exchange (IPX) protocol.

In many cases, a careful examination of network traffic patterns and how users communicate over the network will enable network designers to decide whether a bridge or router will be the more appropriate tool.

Such an examination led Clayton Lewis, network services manager for the city of Tulsa, Okla., to opt for bridges.

Tulsa's net consists of a Fiber Distributed Data Interface backbone that stretches across a campus that includes city hall, the police department and the public works complex. 3Com Corp. NetBuilder II bridges are employed to connect local Ethernet segments into the backbone, while remote NetBuilder bridges connect outlying offices into the backbone.

"Our star topology network did not justify a router-based solution," Lewis says. "The majority of our remote traffic is between remote users and the backbone, not remote user to remote user. For that reason, we had no need to build a mesh network, and instead used the serial ports on the bridges to tie in the remote locations. If our configuration was to change in the future, we can easily upgrade the NetBuilder II bridges to routers with a software change, which gives us some assurance against network obsolescence."

Lewis is also planning an upgrade from 56K bit/sec leased lines to frame relay service in the near future.

BY MARK A. MILLER

The Short List

Bridges

The Short List highlights products Network World *recommends you examine during the purchasing process for bridges. Products included on The Short List for bridges provide useful and unique features that set them apart from other products that may meet all the Buyer's Guide selection criteria. Your criteria may differ based on network configuration and application needs.*

■Triticom's local BridgeIT and remote BridgeIT/r. These software-based Ethernet bridges cost just $695 and come with an unconditional 60-day money-back guarantee, which is one of the best deals for users. To run the software, users supply a personal computer or compatible outfitted with any Intel Corp. CPU from an 8088 all the way to an 80486 plus an Ethernet interface card. The type of CPU selected will determine the price/performance of the bridge.

The products come with features available on more expensive bridges such as address-based filtering, transparent bridging and Simple Network Management Protocol support for Management Information Base-II (MIB) and the bridge MIB.

■Develcon Electronics, Ltd.'s family of Local and Remote Ethernet and Token-Ring Bridges. Develcon is a player at the low end of the market, but its products include some high-end features such as a built-in Integrated Services Digital Network interface on the Model-150 ISDN Ethernet Bridge. What distinguishes Develcon from the competition is its lifetime warranty.

Develcon will replace or repair free of charge any of its bridges at anytime up to two years after a model has been discontinued. However, the unit must be shipped back to the vendor for up to two weeks.

For an additional $550, users can purchase a premium support option on the warranty that includes overnight delivery of replacement products.

■RAD Network Devices, Inc.'s Local Token Ring Bridge and Remote Token Ring Bridge. These products support enhancements that overcome some of the limitations in token ring's source routing protocol and reduce network traffic loads when one node discovers where all others are located and how to reach them.

The company also provides a logical topology known as a virtual ring that speeds up fault recovery, and it has developed a new link-state algorithm for remote bridging known as Dynamic Shortest Path First, a link state algorithm that enables bridges to learn each others' status as well as the best and least-cost path to take when forwarding frames between each other.

RAD Network Devices is also strong in the support area, offering free unlimited customer training and free 24-hour technical support for the life of the product.

■Micom Communications Corp.'s NetRunner family. These products have the unique capability of integrating voice, facsimile and nonlocal-area network data with LAN traffic on the same physical circuit. Several models are available, all supporting Ethernet LAN interfaces and as many as 12 wide-area network interfaces. So point-to-point or multipoint network designs are possible.

■Telco Systems, Inc.'s Magnalink Communications Division's Series 3000HCB-E and Series 3000HCB-T. These bridges provide enhanced filtering for networks with multi-application or high-throughput requirements. User-definable filters can recognize data generated by a particular application and decide whether to forward it and whether the frame should receive priority processing. This enhanced filtering has many advantages, from reducing traffic loads on wide-area network links to giving traffic from a certain application, such as a customer order, priority over more routine traffic.

Data compression is also available, further lowering the WAN link costs. The products also support encryption for enhanced security.

■3Com Corp.'s NetBuilder II. NetBuilder II represents the ultimate flexibility for local or remote configurations. Local-area network interface support includes Ethernet, token ring and Fiber Distributed Data Interface, with plans for 100M bit/sec Ethernet in the future. A wide variety of WAN services are supported, including Frame Relay, Switched Multimegabit Data Service and T-3. Any of these interfaces may be added or replaced without bringing down the basic unit.

NetBuilder II's strong suit is its scalability, allowing the network manager to design a multiport bridged or collapsed backbone architecture with a clear migration path for growth in network size or complexity. NetBuilder II can be software-upgraded to support routing functions.

application or protocol identifier fields within the frames and decide whether the frame should be bridged.

This capability has been an often-requested feature, according to Ed Alcoff, director of product marketing at NAT. Users that need to minimize traffic on particular LAN segments find this feature extremely useful, he says.

Other products allow prioritization of bridged traffic. A filtering/prioritization algorithm can place certain frames waiting in the forwarding queue ahead of others, based on application or transaction types.

For example, purchase orders can be placed ahead of product inquiries, thus improving customer response time. Magnalink Communications and NAT support prioritization.

Magnalink Communication's products have two levels of advanced filtering. The first uses Boolean logic to block or forward traffic based on the values at two distinct sections of the data field. For example, if a frame is created by a word processor and is destined for a specific remote node, the bridge will filter it according to user-defined parameters. The second level enables a selected frame to be pushed to the front of the forwarding queue.

Greg Moore, communications supervisor at Black and Veatch, a consulting engineering firm with headquarters in Kansas City, Mo., has used bridges with extensive filtering to connect the headquarters location with Ethernets in the regional offices and job sites.

"With 4,500 nodes in 30 locations, our communication costs were a significant line item for our budget," Moore says. The company originally planned to build a router-based internetwork but reconsidered after receiving the price quotes. The resulting topology uses routers at the headquarters location and Magnalink Communications bridges at remote locations.

In addition to Magnalink, other vendors supporting data compression on their products include Advanced Computer Communications, Microcom and Retix.

"We use three discarding filters to block [Banyan Systems, Inc.] VINES end-node hello messages from going over WAN links," Moore says. Hello messages are used to enable VINES servers to keep track of one another's status and configuration. "This eliminated over 95% of broadcast traffic. In addition, we incorporated Magnalink's data compression feature to further reduce the bandwidth requirements on the WAN links. The net result is that we are able to squeeze around 130K bit/sec of bandwidth out of a single [64K bit/sec] DS0 channel."

Data compression, used for years in digital voice transmission, is somewhat new to the world of bridges. Compression uses a mathematical algorithm to reduce the amount of data that traverses a communications channel. There are currently no standards for data compression on bridges. Therefore, vendors implement proprietary and incompatible schemes.

With compression, frequently occurring symbols, such as the letters "n" or "s" can be assigned a shorter than normal bit string, thus reducing the amount of data transmitted. Associating multiple letters, such as a "q" followed by a "u," could be used to further compress the data. Therefore, efficiencies ranging from 2:1 to 8:1 with these algorithms are possible.

In addition to Magnalink, other vendors that support data compression on their products include ACC, Microcom and Retix.

BENCHMARKING PERFORMANCE

The addition of data compression on bridges is an acknowledgment that users are demanding higher performance and throughput from vendors. To accommodate those demands, some vendors are enhancing their bus, processing and interface components.

For example, Coral Network uses Application-Specific Integrated Circuits (ASIC) on its products to enhance frame processing, says Walter Jones, vice president of engineering. "Custom ASICs will improve throughput within the bridge switching element," Jones says.

With an ASIC, several bridging functions normally handled by separate chips can be integrated in one chip, thus reducing the need to shuttle frames between chips on the same or different interface boards.

Coral Network has also incorporated fault tolerance into its bridges by including a dual bus and hot-standby network interfaces. "If a network interface fails, its hot standby takes over," Jones says. "All of this is transparent to the wire; the connection to the network is not interrupted."

However, most bridge architectures have remained stable, leaving users to examine the performance figures vendors quote rather than architectures to find a bridge that fits their throughput needs.

To aid users in comparing products, vendors were asked to supply the performance data listed in the chart that starts on page 56. To obtain this data, vendors were asked to provide filtering rates for a standard 64K-byte packet size and forwarding rates for two different packet sizes using precise definitions.

Although bridges actually process frames, it is commonly accepted to state bridge performance data in packets processed per second.

Filtering was defined as the rate at which the bridge can recognize packets that must be forwarded to another segment. This filtering rate is specified on a per-interface basis, meaning the figures in the chart show how quickly one LAN interface on the bridge can filter traffic.

The definition used to obtain forwarding rates was based on the Internet Engineering Task Force's (IETF) Request for Comment 1242, which defines forwarding as the maximum rate at which none of the packets that must be forwarded are dropped by the bridge. The forwarding rate is specified as the rate at which packets can be sent between two LAN interfaces, not on an aggregate basis for all interfaces on the bridge. The speed of wide-area connections was not taken into consideration when coming up with this forwarding rate.

For example, the maximum theoretical filtering or forwarding rate for 64-byte packets — or 512 bits — on an Ethernet is 14.88K packet/sec. When packet size increases to 1,518 bytes — or 12.144K bits — the maximum rate drops to 812 packet/sec. Some figures in the chart may appear higher due to rounding.

Users should also be aware that filtering rates should always be greater than or equal to the forwarding rate because the bridge is able to watch the raw data coming into it faster than it can decide how to bridge it.

The definitions used to assemble performance data from the vendors were derived from work the IETF is doing to standard bridge and router benchmarking tests, which will assure users that vendor performance claims can be compared on a consistent basis (see story, page 61).

MANAGEMENT AND SUPPORT

While vendors offer varying levels of performance, the majority of bridges include Simple Network Management Protocol agent software, which enables most SNMP-compliant management workstations to manage them.

But, as one would expect, there are other

Continued on page 61

Keeping vendors true

With the internetworking market growing at such a rapid pace, vendors continually seek new methods of distinguishing their products, particularly when it comes to stating performance figures. Unfortunately, the "specsmanship" that often results can make it difficult for users to make clear comparisons between products.

However, someone is trying to keep the vendors honest. Scott Bradner, a consultant with Harvard University's Office of Information Technology and chairman of the Internet Engineering Task Force's (IETF) Benchmarking Methodology Working Group (BMWG), has been working for several years to standardize performance benchmark test methodologies.

A suite of standard bridge and router tests are defined in IETF Request for Comment (RFC) 1242. Entitled "Benchmarking Terminology for Network Interconnection Devices," RFC 1242 defines many of the terms used in these tests, thus assuring that all vendors are singing from the same songbook.

To date, 46 vendors have used these tests in Harvard's lab to benchmark the performance of over 65 bridge and router products.

Vendors can rent Harvard's lab to conduct testing or can download a suite of tests from the Internet and test products in their own labs.

Test equipment vendors have embraced this work, as well.

"Bradner's work with the IETF BMWG has defined a basic set of test metrics: packet loss percentage, throughput and latency among them," according to Jim McQuaid, product manager for internetworking metrics at Wandel & Goltermann Technologies, Inc. located in Research Triangle Park, N.C. "Knowing these metrics is an excellent way to judge a bridge's basic performance."

Bradner recently released a new batch of test results that measure throughput and packet loss rate on bridges and bridging routers. He defines throughput as the maximum number of packet/sec a bridge can successfully forward and defines packet loss as the packet/sec a bridge will drop under maximum traffic load. Both tests were performed under a range of packet sizes.

The tests were run in accordance with two RFC documents: RFC 1242, which provides definitions of key terms, and a draft RFC that describes test methodology.

RFC 1242 and test results can be downloaded from the Internet by connecting to host hsdndev.harvard.edu via anonymous FTP. RFC 1242 can be found within the /pub/bmwg directory. Test results can be found in the /pub/ndtl directory.

BY MARK A. MILLER

Continued from page 60

management solutions available. For example, HP, Network Express, Inc., Penril Datability Networks, RAD Data Communications, Inc. and Retix enable their respective proprietary network management systems to manage their own bridges.

Other vendors such as Cray Communications include support for alternative management platforms such as IBM's LAN Network Manager and NetView. Some FDDI bridge vendors that take advantage of FDDI's built-in Station Management (SMT) network management protocol include Fibronics International, Inc. and Xyplex.

With bridge vendors increasingly reaching parity in such areas as basic filtering techniques and management, many are ramping up their service and support offerings as a way to woo customers.

"WAN bridging mandates greater support coverage and built-in service capabilities because there are often no technical personnel in branch offices," says Scott Eliot, marketing manager at Motorola Codex. "We see three critical support issues: FLASH memory for software and configuration download; dial-in access for remote diagnostics; and the availability of seven-day-a-week, 24-hour-a-day service support. One of our service options even guarantees two-hour response time, which is critical for some of our financial services customers."

Many vendors, including Allied Telesis, Inc. and Retix, use flash memory upgrade capabilities, which enable users to reprogram the bridge's memory chips rather than swapping them out for new ones.

The vendor's warranty period can also be used as a tiebreaker between competing products, especially when they are priced similarly. Among the vendors surveyed, 12 months was a typical warranty period, although HP, Olicom USA, Inc. and Xyplex offer 36-month warranties, and Develcon Electronics, Ltd. has a lifetime warranty on their products. Develcon will replace its failed bridges up to two years after a model has been discontinued.

Service contract terms and conditions vary, with free software upgrades for a fixed term, next-day parts replacement and toll-free telephone support among the various options. For example, Cray Communications allows the users to define the terms for their on-site service and software maintenance contracts, thus making allowance for specific customer requirements.

BRIDGE TO THE FUTURE

Despite technical advancements and innovative support and service options, freestanding bridges will have a tough time winning favor with users in the long run. On one side, the vast majority of routers offer not only sophisticated packet processing, but also bridging functionality.

On the other side, bridging functionality is being built into plug-in modules for intelligent hubs.

While this trend may not bode well for freestanding bridge vendors, the evolution of bridging functionality from freestanding products to integrated router and hub platforms will be major benefit to end users, says Doug Gold, director of communications research at International Data Corp. a market research firm in Framingham, Mass.

"We are anticipating that end users will continue to purchase both local and remote bridges for the next few years," Gold says. "However, the connectivity focus will change. The local bridge market will migrate to intelligent hubs, while the remote bridges will migrate to low-end routers."

Gold's research indicates that bridge vendors competing on price alone today will have to develop other distinguishing characteristics. Local bridge vendors will develop strategic partnerships with hub vendors, thus moving their product out of the freestanding chassis and into a hub board. Remote bridge vendors will enhance their portfolio of WAN access capabilities, including adding support for ISDN.

In either case, Gold sees the end users as the ultimate winners. "In hub integration, the bridge becomes just another — nevertheless important — piece of software," he says. "The key is that the bridging function can be integrated with other functions such as network management. With routers, the end user has a migration path to more complex internetworks, thus providing some guarantee against internetwork obsolescence."

So even as vendors of freestanding bridges struggle to add new interfaces and other value-added options, bridges seem destined to become a part of other enterprise networking products.

In the next few years, users will find themselves examing how bridges are packaged as opposed to the basic functionality of this technology.

Miller is a contributing editor and president of DigiNet Corp., a Denver-based data communication engineering firm. His latest book, *Managing Internetworks with SNMP*, discusses SNMP and SNMPv2 from the perspective of the network analyst or manager. Miller may be reached via the Internet at mark@diginet.com.

Bridges on the wane

Many of the 100 readers contacted in the most recent *Network World*/Focus Data, Inc. survey said they have no plans to buy new bridges and will be replacing existing bridges with more functional routers.

Bridge selection criteria
Based on highest possible score of 10

Criterion	Importance rating	Satisfaction rating
Conformance to standards	9.0	8.0
Performance	8.4	8.0
Service/support	8.3	7.8
Management features	8.3	7.1
Support for transparent bridging	7.8	7.7
Ease of use	7.7	7.7
Range of filtering	7.5	6.9
Price	7.3	7.1
Support for source routing	6.9	7.4
Support for source routing transparent	6.7	7.1
Large number of ports	6.1	7.1
Support for frame relay	5.2	6.4
Support for Switched Multimegabit Data Service	5.0	6.4

SOURCE: FOCUS DATA, INC., FRAMINGHAM, MASS.

"I would not recommend that anyone purchase bridges now," said one reader whose comments were typical of many others. "We want to get rid of our bridges and move to routers. As our local-area networks get bigger and more crowded, it is becoming more and more important to break them up into smaller segments via routers."

Another reader said he opts for bridging routers — or "brouters" — over bridges that do not provide any routing features. "I prefer to use bridges that have routing functionality because of their management capabilities, their network segmentation, their security features and their throughput."

The results of the survey are based on responses from 86 readers who said they use bridges that do not support routing and 14 readers who are considering purchasing such nonrouting bridges. Source routing and source routing transparent bridge users were included in the survey. Bridges that support routing will be covered in the Sept. 27 router Buyer's Guide.

Although many users are moving away from bridges, they did rate the criteria used when selecting a nonrouting bridge on a scale of one to 10, with 10 being highest. Users said the most important criteria were conformance to standards, performance, service/support and management features (see graphic).

For instance, one reader said that making sure vendors conform to standards will avert the type of situation the reader is currently in.

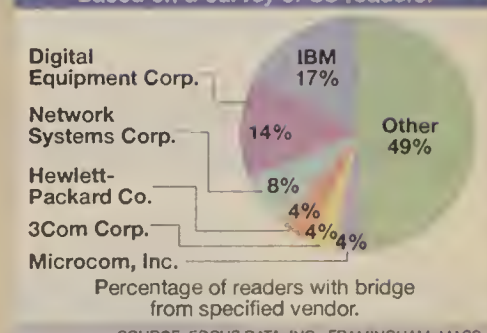
The reader uses a Digital Equipment Corp. bridge that supports a version of the Spanning Tree Protocol that was released prior to the now widely accepted standard version. This outdated implementation inhibits interoperability between the DEC bridge and others.

The readers surveyed collectively use — or plan to use — a total of about 5,400 bridges. The vast majority, 88%, said they currently or will soon use 50 or fewer bridges.

The remaining 12% currently, or will in the future, use more than 50 bridges. The most bridges used by any reader in the survey is 1,800. Another user has 1,300 bridges installed.

Two thirds of the readers say they use bridges to link remote sites. However, almost 3,500 of the bridges covered in the survey are used to segment traffic on local nets.

Bridge market leaders
Based on a survey of 86 readers.



SOURCE: FOCUS DATA, INC., FRAMINGHAM, MASS.

BY KYLE NITZSCHE

Focus Data, Inc., a Framingham Mass.-based market research firm, gathers data from end users to determine network and information systems usage, trends, needs and satisfaction levels. For more information, call Mona Dabbon, (508) 626-2556.

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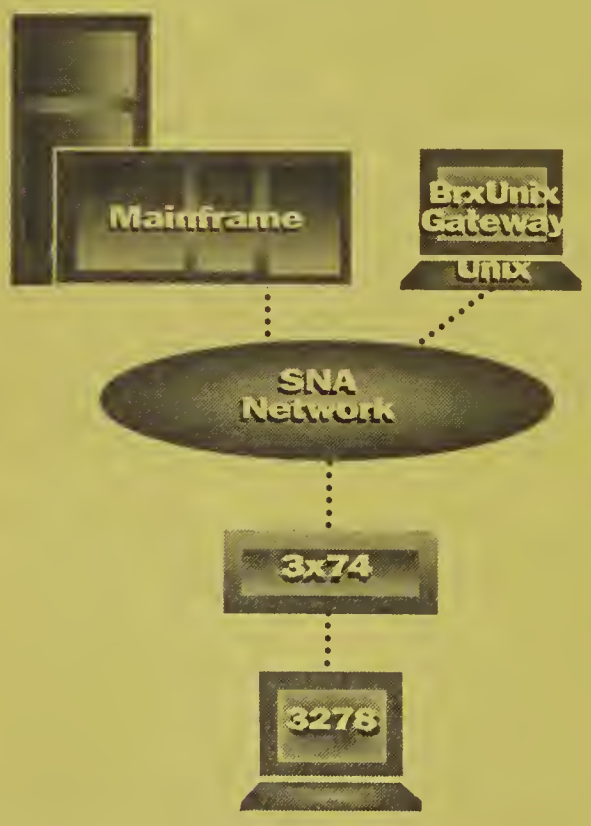

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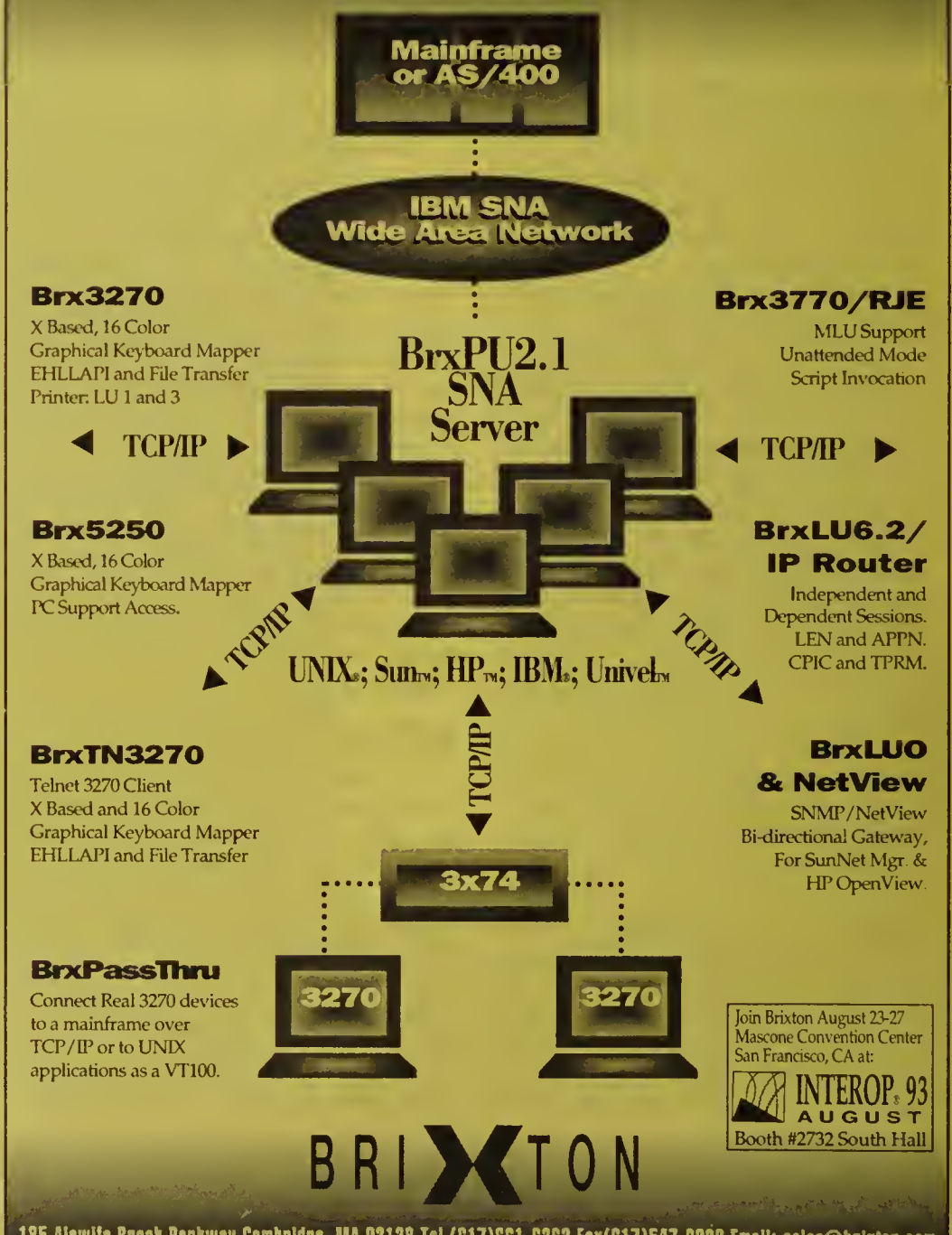

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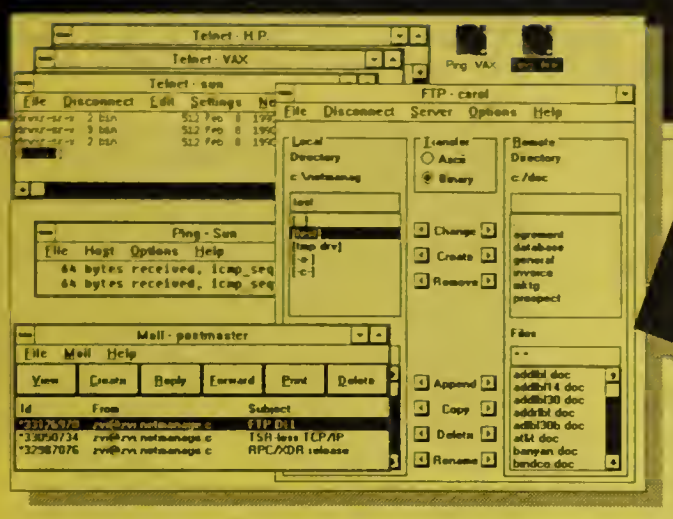

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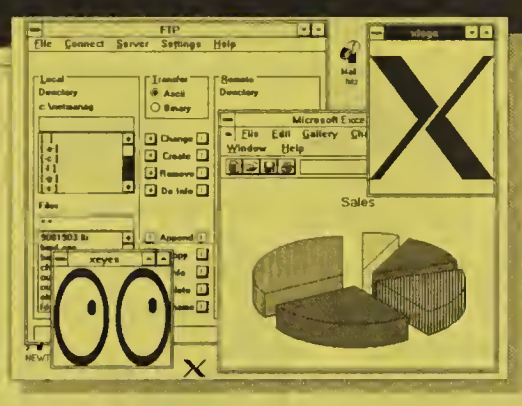

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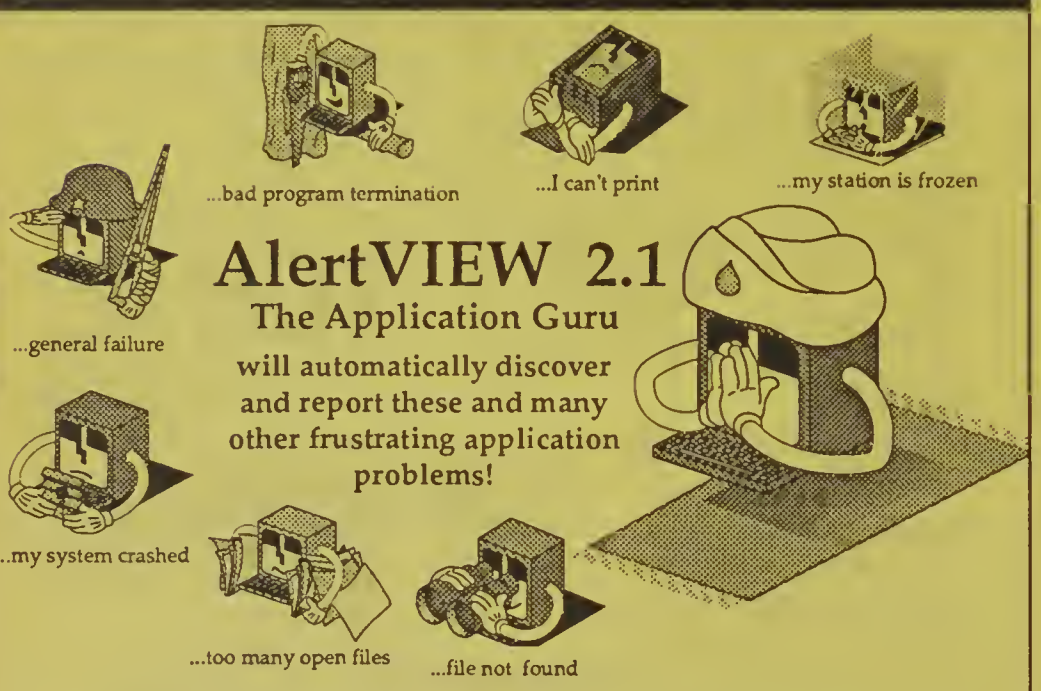

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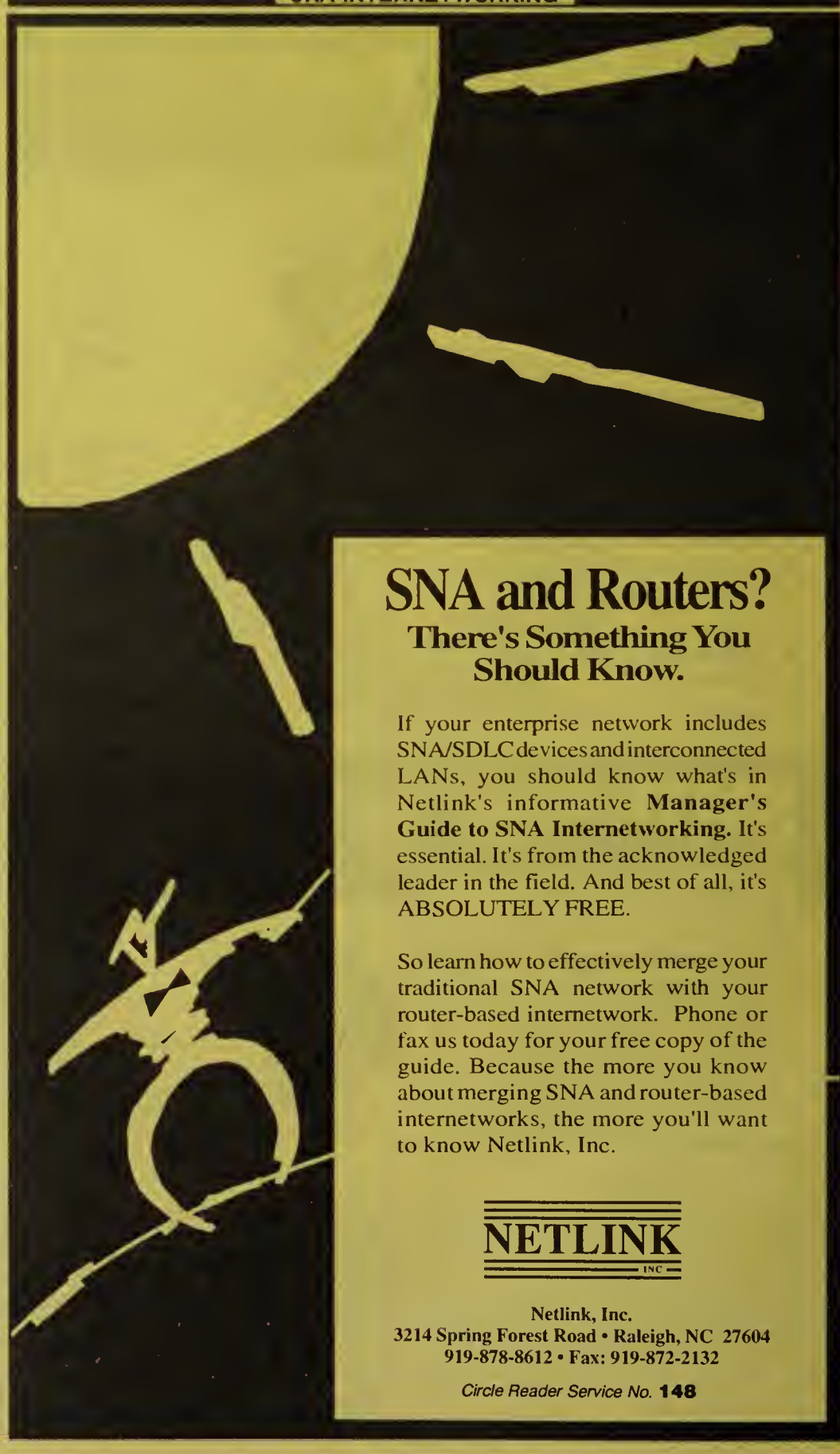

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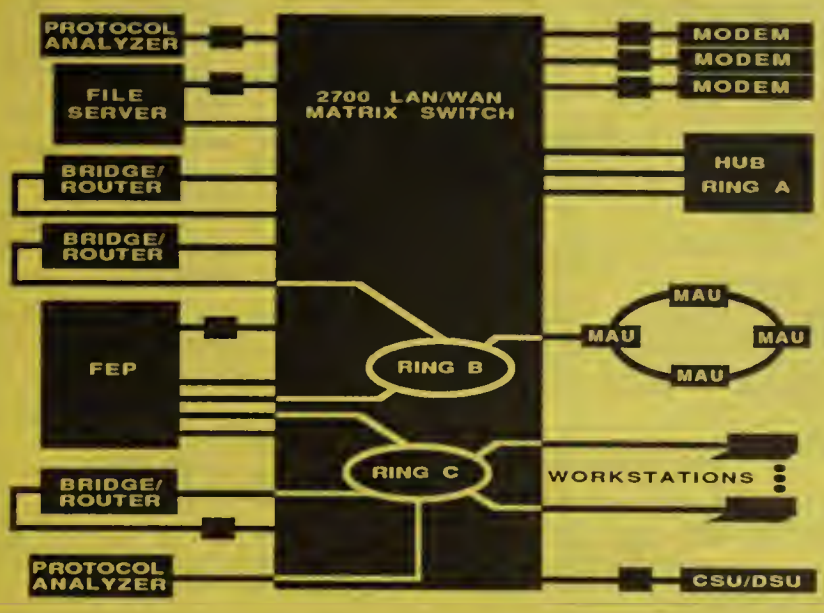

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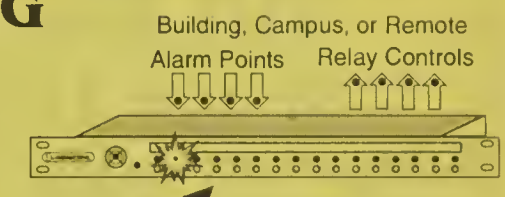

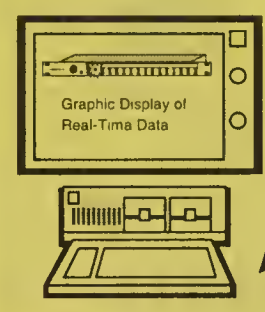

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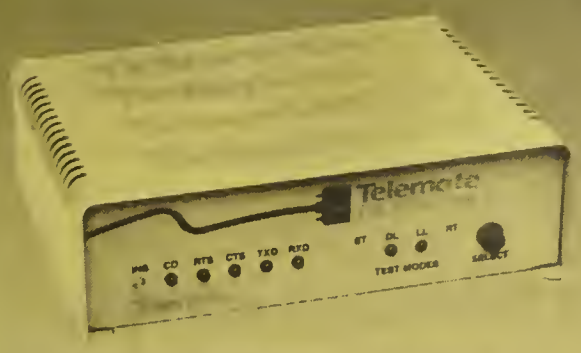

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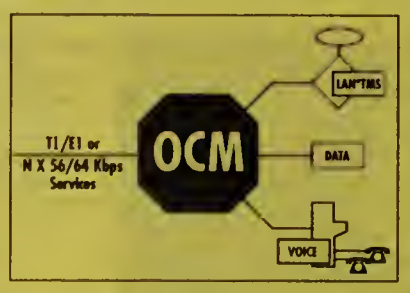

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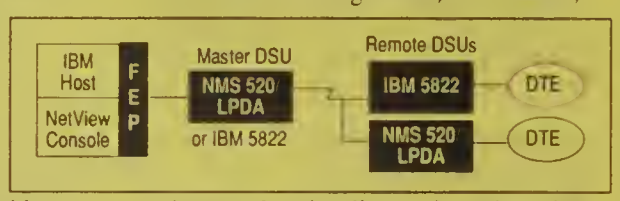

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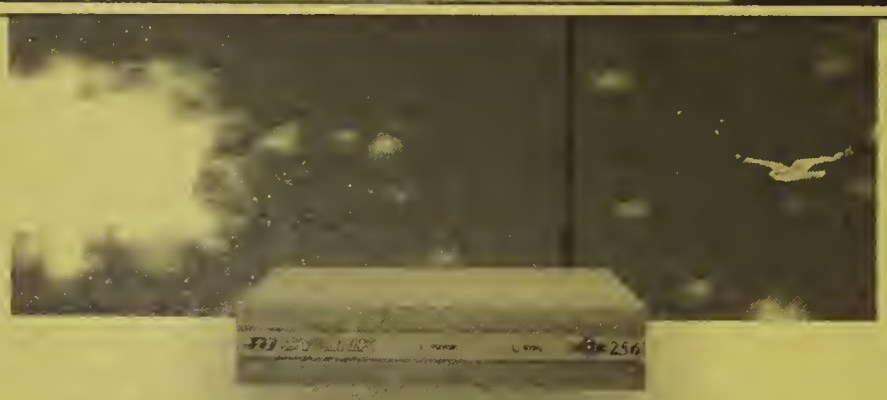

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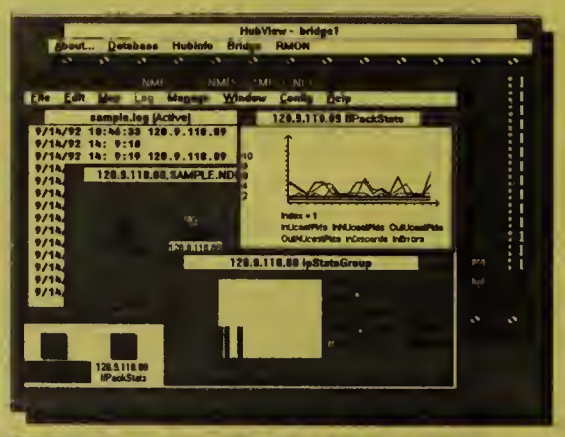

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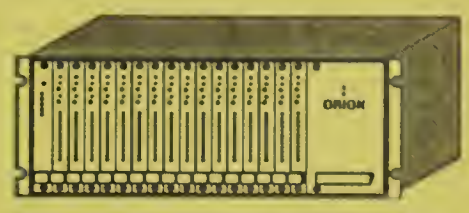

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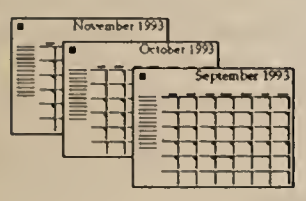

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Cable TV

Continued from page 4

computers with Ethernet adapters, both PSI and Continental Cablevision will have to upgrade their networks to bring it on-line, according to Martin Schoffstall, PSI vice president and chief technical officer.

David Fellows, senior vice president of engineering and technology at Continental Cablevision, said the company will deploy a 100M bit/sec network to link the headend facilities at its CATV operations in 16 states.

PSI will collocate switching facilities at the headends, which are used to plug satellite-distributed video signals into local cable grids for the Internet/CATV link.

Of the approximately 550 MHz of bandwidth available on Continental Cablevision CATV networks, 6 MHz will be set aside to carry a 10M bit/sec Ethernet channel to homes and businesses.

"None of the telecom providers have a significant influence on the Internet market today."

NEW ERA

The partnership may signal a seismic shift in the telecommunications landscape, shaking traditional carriers.

"None of the telecommunications providers, local or long-distance, have a significant influence on the Internet market today," Schoffstall said. "They have no marketable vision —just their real or perceived fears."

The Cable-Telcom Act prohibits cross-ownership of CATV and telephone facilities in the same market, although that restriction has started to crumble (see story, page 4). Fellows said lawyers at his company believe the law applies only to voice services, not data.

Continental Cablevision may elect to market the Internet CATV access separately without requiring customers to buy CATV programming. "We could choose not to require that and just run an Ethernet link to the house," Fellows said.

"This is the first time a cable TV company has announced Internet access," Fellows said. "But we're certainly not going to be the last."

The agreement between PSI and Continental Cablevision is sufficiently open to allow other CATV companies to begin offering Internet data services, said William Scrader, president and chief executive of PSI. He said he expects PSI to make similar announcements with other CATV operators in the future.

INTEROP

Continued from page 6

relay.

John Kavazanjian, vice president of operations for Kendall Square Research in Waltham, Mass., attended the Frame Relay Forum meeting at INTEROP 93 to learn how other companies are using frame relay services to simplify network operations.

MILD INTEREST

Kavazanjian said he was mildly interested in ATM, which will eventually be used to provide frame relay services.

"I think we'll keep our eyes out to see where ATM fits into wide-area networking, but we need ATM standards to be finalized before we take a good look at ATM services," Kavazanjian said.

John Mikula, senior analyst at Chevron Information Technology in San Ramon, Calif., said he was most interested in examining multiprotocol routers.

Mikula said consolidating local-area network and Systems Network Architecture data onto a single network would provide immediate benefits for his company, but he is not yet sold on vendors' claims that they offer mature, reliable technology that will allow him a smooth transition.

"Going connectionless is downright scary," he said.

LONG-DISTANCE COMPUTING

Some attendees at INTEROP came from quite a distance to spend a week learning from the tutorials and checking out products on the exhibit floor.

Toine Waijers, systems coordinator at the Ministry of Traffic and Water in Delft, The Netherlands, said his agency is installing a network for the department's 15,000 users.

Waijers said he paid close attention to X.400 messaging and X.500 directories at INTEROP because the ministry will be using X.400-based work flow and work group applications on its new network.

Joop Veenis, an advisor with Twijnstra Gudde management consultancy of Amersfoort, The Netherlands, said the show gave him the opportunity to meet U.S. vendors offering systems integration and network management products.

Distributors in The Netherlands have traditionally provided limited information about U.S.-based vendors such as Hewlett-Packard Co. and Digital Equipment Corp., according to Veenis.

Partnership

Continued from page 1

provide a certain base level of bandwidth and they don't have to worry about the database is nonsense," Bullock said. "The network manager and database administrator need to work hand in hand and understand each other, or the situation will be bad. We collude like crazy."

To properly estimate net bandwidth required to support a client/server application, net managers and application developers need to do a bit of up-front field work, said Wayne Schmidt, systems development manager at United Behavioral Systems, Inc. (UBS), a Minneapolis-based provider of mental health and substance abuse services.

UBS, which is implementing a client/server patient administration system to serve 30 offices nationwide, had its network managers visit branch offices and meet with users of the current patient administration system.

The site visits enabled the network managers to determine who was using the system as well as what transactions they were executing and how often.

This gave the network managers a general idea of the number and size of packets the new client/server application would generate and in what volumes throughout the day.

Application developers, on the other hand, had to understand the components of the network over which their client/server application would run, as well as potential points of failure and bottlenecks.

"The application people are the first to get called when there is a failure. They need to know how to pinpoint the source of a problem, whether it's hardware-, software- or network-related, and call in the right people to solve it," Schmidt said.

UBS network managers and application developers also teamed up to simulate the impact the client/server application would have on the firm's network.

The team used analytical equipment to check for bottlenecks and gauge response times as different sizes and volumes of packets were sent across the firm's simulated network, which consisted of two 16M bit/sec token-ring local networks linked to a Transmission Control Protocol/Internet Protocol backbone via Cisco Systems, Inc. routers.

"Much to our surprise, we found we only needed 56K bit/sec links," according to Schmidt.

John Van Den Hoven, manager of database and enterprise information systems at Noranda, Inc., a diversified natural resources company in Toronto, said his company's database and net experts have teamed up to install end-user database access tools, among other things.

Noranda's database, application and net groups have worked together to determine the best network design to support new databases, Van Den Hoven said.

"We look at the size of the database and estimate how much it will be used to determine the appropriate bandwidth to avoid performance problems and to provide flexibility," he said.

Cooperation between the database, network and client/server system staffs continues once a new system is installed, Van Den Hoven said.

The company's help desk draws on resources from the database, network and personal computer support groups, which often wind up working together in an ad hoc manner, or in a more formal manner when problems persist, he said.

Can we talk?

Jeff Held, a partner at Ernst & Young's Technology Services Practice, outlines key discussion points for network and application experts:

1 **Where do we put components of a client/server application?**
"The fundamental issue is what goes where. There's a trade-off among network, hardware and software requirements."

2 **Is there enough bandwidth to support application traffic?**
"If bandwidth is expensive, design the application to minimize utilization. If it is cheap, design the application to maximize it. The biggest problem with most client/server applications is that they are designed for the LAN but fall apart over an internetwork."

3 **Who's responsible for management and support?**
"If it was hard to pin down what was wrong in the mainframe environment — with network and application guys pointing at each other — think about [what happens] when you've got pieces of the application scattered all over an internetwork."

GRAPHIC BY SUSAN J. CHAMPENY

West Coast Correspondent Peter Lisker contributed to this article.

Fibronics

Continued from page 1

and FDDI modules in the GigaHub through the use of a special adapter.

Fibronics will also roll out a suite of new hub modules, including 16-port Ethernet modules that can be remotely configured to connect to any of GigaHub's eight internal Ethernet buses. This enables users to ease the burden on congested net segments without physically visiting the wiring closet.

Later versions will allow modules to be segmented into banks of users that can be switched among the backplanes.

Each new Ethernet module will also act as a self-contained Ethernet switch, providing a 10M bit/sec dedicated Ethernet link to high-performance workstations and servers. The company said it will deliver 24-port token-ring modules by the end of the year, with plans to offer segmentation capabilities so users can take advantage of the 40 backplanes available.

In 1994, the company will roll out 16-port FDDI modules as well as token-ring and FDDI switching capabilities, so users will be able to forge dedicated links to high-performance workstations and servers in much the same way they can with Ethernet switching. In a maximum configuration, the hub can support 192 Ethernet ports and either 288 token-ring ports — or 192 FDDI ports or some combination of the two — putting it on par with Optical Data Systems, Inc.'s high-density hub that supports a maximum of 384 token-ring ports, 576 Ethernet ports or 62 FDDI ports.

Under the GigaHub's hood

- 12 slots
- Aggregate hub capacity of 12.08G bit/sec
- 4 redundant power supplies with load balancing
- 8 10M bit/sec Ethernet backplanes
- 40 300M bit/sec token-passing backplanes
- Ethernet switching
- Supports maximum of:
  192 Ethernet ports
  288 token-ring ports
  192 FDDI ports

Future capabilities:

- Token-ring and FDDI switching
- Asynchronous Transfer Mode switching
- Frame-to-cell conversion

SOURCE: FIBRONICS INTERNATIONAL, INC., PEMBROKE, MASS.

The GigaHub comes equipped with four redundant power supplies, one of which is configured as a hot standby. The hub will load-balance between the other three power supplies, ensuring that none of them is ever running at maximum load. All modules for the hub are hot-swappable.

To keep all 12 slots available for LAN support, Fibronics has imbedded Simple Network Management Protocol-based net management functionality in the hub's architecture. The Extended System Management agent runs on the hub's motherboard and controls all the GigaHub's elements.

Next year, Fibronics is planning to deliver a board-level ATM switch that will be a four input-by-four output matrix switch. ATM interfaces and I/O modules are also under development for speeds up to 155M bit/sec.

According to analysts, the hub will allow Fibronics to go head-to-head with some hub vendors developing similar products as well as up against some ATM switch vendors because of the high bandwidth available. "Fibronics is part of the first wave to hit the beach with a high-performance switching hub, and its strategy falls in line with some of its better known rivals," said Fred McClimans, program director at Gartner Group, Inc., a consultancy in Stamford, Conn.

"On paper, it looks like a tremendous platform, but the question is whether they can get it in front of not only end users, but systems integrators who will be able to get it into more markets," he added.

The GigaHub and the Ethernet and token-ring modules will be available by year end. The hub will be priced between $5,700 and $21,000, depending on configuration.

✆Fibronics: (617) 826-0099.

IBI

Continued from page 1

Sources said the initial release of EDA/SQL 3.0 will roll out on IBM mainframes, Digital Equipment Corp. VAX computers, one or more Unix platforms, OS/2, Novell, Inc.'s NetWare and Microsoft Corp.'s Windows NT.

John Senor, vice president of IBI's EDA division, acknowledged that his company will announce a new version of EDA/SQL by the end of the year but declined to provide details. However, he said, "The new version will leapfrog by a generation anything in the market today, and we intend to back up that claim."

George Schussel, chief executive officer of Digital Consulting, Inc. in Andover, Mass., said EDA/SQL 3.0 sounds as if it will be a significant improvement over existing EDA/SQL technology, which does not support location-transparent data access or data warehousing functions.

The addition of DCE-like services will make it much easier for users and database administrators to use EDA/SQL in an enterprise environment. The services will enable users to access database tables anywhere in a corporate network without having to specify their location or define a connection path.

Sources said IBI has spent 15 months developing DCE-like services that would run across multiple platforms.

Once OSF DCE technology matures and extends to more platforms, IBI will likely replace its proprietary distributed services with technology based on the OSF standards, they said.

EDA/SQL 3.0's distributed directory will keep track of which database tables on which nodes users are authorized to access. If administrators add a new table or change the location of a table to another node, that information is automatically updated in the distributed directory and made available to users.

On the administrative side, EDA/SQL 3.0 will support distributed systems management facilities that enable database administrators to manage a network of distributed databases from a central location.

Sources said EDA/SQL 3.0 will contain "push-button" features that allow administrators to define data schemata, connection paths and configuration files for many users at once.

EDA/SQL 3.0 will enable administrators to remotely track system performance and monitor failures. It will also allow net managers to change system parameters, such as priority levels and path connections, to optimize response times, eliminate bottlenecks or restart downed systems. The new version of EDA/SQL will support various data distribution services, including copy management and replication.

Copy management enables administrators to copy data from one database table to another at predefined intervals. Replication keeps one or more databases in sync by replicating transactions across a network in near real time.

These services are critical for amalgamating data from many data sources to create a single decision support database, sometimes known as a data warehouse.

Oracle

Continued from page 4

scheduled to enable the product to support X.400 as well as IBM's OfficeVision/VM and Professional Office System (PROFS).

Oracle Office will automatically propagate and synchronize directory information between coupled servers across an enterprise. Synchronization, always a problem in heterogeneous environments, will be handled via a technique called fuzzy matching.

A source who asked not to be named said preliminary discussions have been initiated between Oracle and Soft•Switch, Inc., a vendor of gateway products that link disparate messaging systems. Soft•Switch and Oracle officials would neither confirm nor deny the claim.

Knight said Oracle's approach will differ from that of current personal computer-based messaging systems. "It's important to move from the fat client/thin server model — where the bulk of the processing is done at the workstation level — to a model where the server is the primary point for messaging."

Providing an application-enabling messaging infrastructure tied to Oracle7 is a vital step for the vendor, analysts said.

"Oracle has done an abysmal job selling their applications," said Richard Finkelstein, president of Performance Computing, Inc., a Chicago-based consulting company.

"All you have to do is look at their dying-a-quiet-death spreadsheet product, SQL*Calc, to see they have a fundamental problem in this critical aspect of the software arena," he said.

Sprint

Continued from page 1

ATM's cell-based technology offers a way to blend multimedia traffic at high throughput rates and low latency.

"We've made no strategic decision to put voice on an ATM backbone," Emmett said. "But I suspect that we will find it cost-effective in terms of our [current] virtual private network."

Alcatel/Sprint switch ready soon

Alcatel Data Networks, a joint venture of Sprint Corp. and French-based Alcatel N.V., last week detailed its Asynchronous Transfer Mode (ATM) switch rollout plans for the U.S. and Europe. Because ATM standards differ in the U.S. and Europe, Alcatel Data Networks will field two versions of its ATM switch, the Alcatel 1100 High-Speed Switch (HSS). The European version will ship this October, while the U.S. version will be ready in the first quarter of 1994.

The Alcatel 1100 HSS, a prototype of which was demonstrated at INTEROP 93 August, can support several protocols (see graphic), aggregating traffic such as frame relay and X.25 data at speeds from 64K to 155M bit/sec for transmission as ATM cells over facilities supporting speeds up to 622M bit/sec.

Alcatel 1100 HSS

- 10G bit/sec Asynchronous Transfer Mode (ATM) switch matrix
- 29 ports capable of supporting frame relay, Switched Multimegabit Data Service, X.25, SNA, IP or ATM protocols
- Aggregates traffic between 64K and 155M bit/sec for adaptation to ATM cells
- Supports multicasting
- LAN ports to be added in 1994

The European version of the Alcatel 1100 High Speed Switch (HSS) will be available in October, with the U.S. version (described above) available in the first quarter of1994. Pricing will range from $50,000 to $100,000, depending on configuration.

SOURCE: ALCATEL DATA NETWORKS, RESTON, VA.
GRAPHIC BY SUSAN SLATER

The 29-port ATM switch can play a role at the customer's premises or in carrier networks as a concentrator for ATM traffic.

Unlike some bus-based ATM switches, the Alcatel 1100 HSS uses a 10G bit/sec switch structure named a "banyan matrix" after the banyan tree's unusual branch pattern.

The bus technology can only service one user at a time under a collision contention scheme, said Alan Taffel, vice president of marketing at Alacatel Data Networks. This leads to greater delay and a higher chance of dropped packets. Further, Taffel said, "If you lose the bus, you lose everybody on the path."

Alcatel Data Networks will also provide the functionality present in the 1100 HSS as an upgrade module for Sprint's TP 4900 cell relay switch, recently renamed the TPX. Sprint uses this switch in its network to support X.25 and frame relay. The switch is also deployed at 200 corporate sites in more than 40 countries, according to Taffel. Pricing for the ATM module has not been set.

Alcatel Data Networks: (703) 689-7400.

BY ELLEN MESSMER

PRICED TO MOVE

Pricing the new ATM service was a challenge, admitted Greg Crosby, Sprint's director of data product management. The service will initially be priced on a customer-specific basis using either usage-based or flat rates.

"We understand early users will have a difficult time selecting a plan," Crosby said. "Will it be cheaper than a T-3 point-to-point line? Yes."

Daniel Briere, president of TeleChoice, Inc., a consultancy in Montclair, N.J., said a T-3 line between Miami and Seattle costs about $165,000 per month with a one-year commitment, while Sprint is willing to price T-3 ATM at a flat rate of $52,000 to $62,000 for the same span.

"ATM is definitely priced to move," Briere said. "But the big hindrance is the local loop." To access ATM at any of Sprint's 300 points of presence nationwide, customers will have to buy T-3 access from local carriers, which runs about $20,000 to $30,000 per month.

Dominique DeAngelo, vice president of product management at Sprint, said ATM is targeted at applications including transaction processing, LAN internetworking, image transfer, electronic data interchange and file transfer.

"ATM is definitely priced to move," Briere said. " But the big hindrance is the local loop."

But Sprint and Hughes Aircraft officials acknowledged that the initial service will be limited due to some important ATM standards still being fleshed out.

"Everything is still very experimental at this point," Emmett said. Network management capabilities, for example, are not yet well developed, but management is not critical at this point, he said.

The Sprint ATM service will only support permanent virtual circuits at first since the specification for switched virtual circuits has yet to be approved by the ATM Forum, the group creating the industry standard.

Once that standard is approved — expected at the end of 1994 — Sprint plans to add support for switched virtual circuits within 12 months.

INFRASTRUCTURE

Sprint has installed three T-3 ATM switches, one of which is BAS-2010s from TRW, Inc., and has two more scheduled to go on-line by October. The carrier will take delivery of an unspecified number of TRW's higher speed BAS-2010C switches by the end of the year. The BAS-2010C supports ATM interface speeds up to 622M bit/sec.

Sprint is already looking to future ATM services planned for next year.

In early 1994, it will add support for 155M bit/sec ATM port speeds, provide users with custom network management using the Simple Network Management Protocol and offer fault management through alarms for configuration, performance and status.

Plans to support frame relay, Transmission Control Protocol/Internet Prototol, Switched Multimegabit Data Service, X.25 over ATM and a multicast service are also in the works.

Last week, Sprint locked arms with a cadre of ATM equipment vendors, whose products Sprint has already installed in its own network or will include in users' ATM systems integration projects in the future.

These include Alcatel Data Networks — in which Sprint holds an interest (see story, this page) — as well as Cisco Systems, Inc., Digital Link Corp., Fore Systems, Inc., NetLabs, Inc. and TRW. Sprint is also currently testing Wellfleet Communications, Inc. routers for use with ATM.

Battle

Continued from page 1

Networking Systems director of enterprise management.

Developing from the same code base will allow software vendors to write applications that can work with both NV/6000 and Polycenter NetView, DEC and IBM said.

Observers said it is also intended to stem any competitive opportunity IBM might gain over DEC by enhancing NV/6000.

The companies will also combine their management application development programs and engage jointly in other network and systems management activities.

The arrangement indicates that DEC's priority is to stimulate sales of its Alpha hardware, even at the expense of projects such as Polycenter.

"Our goal is to have the broadest range of applications available on the Alpha platform," said Rose Ann Giordano, DEC vice president of production systems software. "We chose to license NV/6000 to meet that requirement. It has the top-rated user interface and management capability in the industry and OpenView [application program interfaces] to attract independent software vendors."

NV/6000 is based on OpenView, Hewlett-Packard Co.'s popular network management platform.

SLOWLY UNRAVELING

In adopting a product from a long-time competitor, DEC has acknowledged and succumbed to market reality. Though observers say DEC's Polycenter Framework was a credible attempt to offer a network and systems management platform, it never garnered the support of application developers that is vital for market stability and longevity.

Indeed, DEC's own missteps, coupled with the lack of a key industry endorsement, precipitated developers' chilly reception of the product and ultimately proved to be its undoing (see graphic, page 1). Users had mixed reactions to the news.

"It could be somewhat of a problem because we use Polycenter to manage our VAX boxes," said Bill Bochnik, systems analyst at CIBA-Geigy in Westchester County, N.Y. Bochnik said his company is migrating to DEC's Alpha platforms but is not familiar with IBM's NV/6000.

"It's a welcome change," said Craig Paul, technical support programmer at Kansas University in Lawrence. "[Polycenter] requires a lot of subsidiary packages to do its stuff, and it's very memory intensive. NetView/6000 is easier to manage in terms of configuration."

DEC's decision left Walt Wojciehowski, associate director of information system management at Mass Mutual Life in Springfield, Mass., "kind of surprised."

"I thought they would develop [the Polycenter] product set as part of their Enterprise Management Architecture strategy," he said. "I'm quite surprised that they backed away from that. I thought it was one of their flagship products."

While current Polycenter users may be stuck with a product that will not evolve, analysts said the move to NV/6000 could be beneficial to customers in the long term.

"They needed to get past Ultrix and VMS," said Charlie Robbins of the Aberdeen Group, Inc., a consultancy in Boston. "Polycenter didn't have the [standard] APIs, and it wasn't easy to work with."

DEC said it will continue to sell and support Polycenter Framework for its VAX and Ultrix customers. The company will, however, provide migration tools and incentives for customers to move to Polycenter NetView.

DEC has not yet established pricing for Polycenter Framework.

NETWORK WORLD

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A PRIMER on emerging technologies

Kerberos steps out of mythology to watch over network security

BY BOB BALES

Security is always a big concern for network managers, especially in environments where users need to access applications and data on numerous local-area network servers, mainframes and minicomputers.

Simple password security provides an initial yet beatable layer of protection. However, an emerging technology called Kerberos offers a higher level of protection.

Kerberos is authentication software that can be added to existing security systems. Basically, it authenticates that a user requesting access to an application or data is indeed the authorized user and not an imposter. It also prevents hackers from tapping into network circuits and stealing passwords.

Kerberos accomplishes these tasks by elaborately encrypting such sensitive information as passwords that are transmitted around networks, which make them useless to hackers that intercept and analyze network traffic.

However, Kerberos requires modification to every application that is to take advantage of this added protection. The amount of work required varies, but it can take a Unix programmer as long as a day per application.

Kerberos was originally developed as part of the Massachusetts Institute of Technology's Project Athena to give individual student, researcher and faculty workstations access rights to certain minicomputers. But while Kerberos was designed for MIT's minicomputer-based network, it is not restricted to that environment.

Kerberos-based products are starting to appear. For example, the Open Computing Security Group of Redmond, Wash., specializes in Kerberos software and offers products for Unix applications, as well as for applications that run on Apple Computer, Inc. Macintoshes and personal computers. Additionally, IBM and the Open Software Foundation, Inc. plan to make Kerberos part of their Unix operating systems.

KERBEROS COMPONENTS

Kerberos was named for the three-headed watchdog that guarded the gates of Hades in Greek mythology. Analogously, Kerberos uses three components to guard a network's gate: a database, an authentication server and a ticket-granting server. All three components sit on a single, physically secure server.

Each component performs a different function. The Kerberos database contains all network user names, passwords, the network services each user can access and an encryption key associated with each service. In Kerberos terminology, a service can be an application on a host, or it can be something as simple as giving a user permission to look at a directory of files. The Kerberos database is the only location on the network where passwords are stored.

The Kerberos authentication server ensures that the person requesting the use of a network service is indeed who he claims to be.

The ticket-granting server issues "tickets" to the user after the authentication server has verified the user's identity. A ticket is a string of code that contains enough information to securely pass the identity of the user between the authentication server and the computer on which the service the user wants to access resides.

To provide additional security, Kerberos uses another type of credential, called an authenticator, which grants users access to specific services. An authenticator contains information about the user that, when compared with the ticket, proves the user is indeed the person who was granted the ticket. Both tickets and authenticators are encrypted using Data Encryption Standard (DES) private-key encryption algorithms. Both the ticket and authenticator must be presented to the appropriate server for the user to gain access to that server and the desired service.

To start the Kerberos authentication process, a user must log on to a workstation by entering a password and requesting a service on a host computer. This process appears to the user to be the same as logging on to a server or host. However, there is a major difference. Instead of sending the password over the network, only the user's name and the name of the service the user wants to access is transmitted to the secured authentication server.

The authentication server checks this request by looking up the information in the Kerberos database. If the user has access rights to the service requested, the authentication server creates a ticket for the ticket-granting server. This ticket contains the user's name, the name of the ticket-granting server, the time, a time limit for which the ticket is valid, the user's network address and a randomly generated, temporary private session key. All of this information is DES-encrypted using a key known only to the authentication and ticket-granting servers.

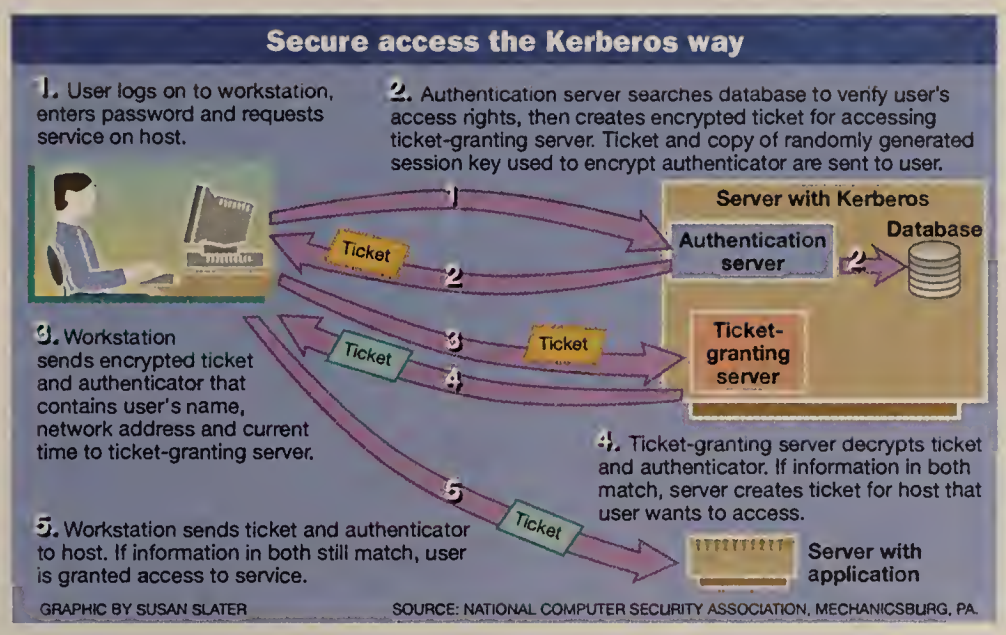
The authentication server sends this ticket back to the user along with a copy of the random session key. This information is encrypted yet again with the user's private key, which is known only to the Kerberos server and the user. All this encryption is necessary. If someone intercepts this package of information while it is being sent over the network, they will not get any useful information unless they know the encryption keys.

Once this information is received by the client, the user's password is converted to a DES key and used to decrypt the response from the Kerberos server. If the decryption is successful, the client stores the ticket and session key and erases the user's password and the DES key. If another person uses the workstation, there is no record of the password or DES key.

Gaining access to the computer with the desired service requires the ticket and an authenticator. The authenticator contains the user's name, network address and the current time. The authenticator is encrypted using the session key sent from the Kerberos server. The client then sends the encrypted authenticator and the ticket to the server the user wishes to access.

The server decrypts the ticket using the common key it shares with the Kerberos server. It then takes the session key from the decrypted information and decrypts the authenticator. The server then compares the information in the ticket to that in the authenticator and the address. If there is a match, the server allows the user to access the desired service.

The server also checks the current time against the time the ticket was generated. If the time is too far off, it assumes the request has come from someone who is replaying a previous request captured from the network and denies access.



THE UPSHOT

Although Kerberos has many strong points, it is not a total panacea. As mentioned, every network application must be modified to use Kerberos, which requires a company to own the application source code and invest valuable programming time. It is nearly impossible to add Kerberos to off-the-shelf software, which a company licenses but does not own.

Another drawback is that it relies on the password as the sole means of identifying a user. This makes Kerberos susceptible to a "dictionary attack." A hacker who has intercepted an encrypted password can take a file of all the words in a dictionary and run it through DES encryption. The encrypted password stolen from the network is then compared to the encrypted form of every word in the dictionary. If there is a match, the hacker can, in theory, access all services the legitimate user can.

Forcing the use of passwords not listed in the dictionary makes this problem disappear. Such passwords can be difficult to remember, but an inventive network manager can remedy this problem by combining two short words with a numeral, such as "lunch4me."

These issues aside, Kerberos is likely to be successful because it provides a higher level of security than that offered when using only a password.

And unlike many security systems that place the responsibility of security on the end user, Kerberos is automatic and transparent to the end user, performing all of the encrypting and information passing in the background. That should make Kerberos a hit with the user community.

Bales is executive director of The National Computer Security Association (NCSA) in Carlisle, Pa. NCSA recently published the "Information Security Wishbook," which is available free of charge by calling (717) 258-1816.

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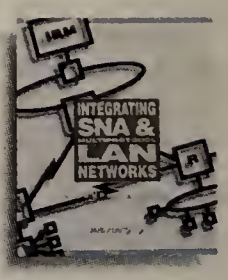

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Thanks,

John Gallant

John Gallant
Editor

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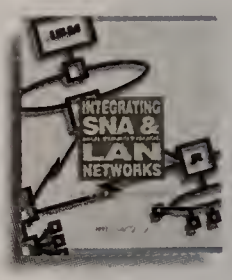

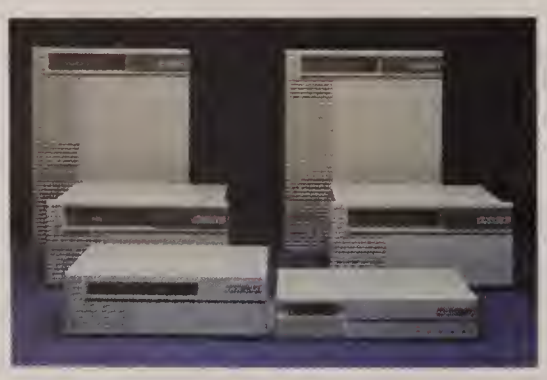

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Please submit a 250- to 500-word abstract explaining how networking has helped your organization achieve its strategic goals. How has networking helped you differentiate your products and services from competitors or launch new offerings? How has it enabled you to bring new products and services to market more quickly? How has it helped you reduce your operating costs? How have technologies such as electronic data interchange helped you build closer working relationships with customers, suppliers and other business partners?

The size of your network isn't important; what matters is how networking has helped your company achieve its objectives. Only entries submitted by users will be considered. No vendor-supplied customer nominations please.

Please print your abstract on a separate sheet and return it with an entry form via MCI Mail (Network World 390-4868), by facsimile at (508) 820-3467 or by mailing your entry to: Special Projects Editor, *Network World*,161 Worcester Road, Framingham, Mass. 01701.

Please be sure to include your name, title, address and phone number.
All entries must be received by Sept. 13.

Get the recognition you deserve for your innovative networking efforts by entering *Network World's* Ninth Annual User Excellence Awards today!

Good Luck!

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